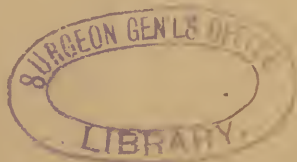

THE PROCEEDINGS
OF THE
QUARANTINE CONFERENCE

'''

HELD IN MONTGOMERY, ALA., 1889

On the 5th, 6th, and 7th days of March, 1889.

The Brown Printing Company, Montgomery, Ala.



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PREFACE.

By way of preface to the Proceedings of the Montgomery Quarantine Conference herewith published, I desire to say that I have printed said Proceedings just as they came to me, from the Editing Committee. It is, however, proper for me to state that the discussions given in the text have been clipped from the reports of the daily papers. While they are approximately correct, they are not usually adequate reproductions of the remarks that were actually made by the several speakers.

The subjoined circular letter explains, perhaps, at sufficient length, how and under what circumstances the Conference had its origin.

JEROME COCHRAN, M. D.,
State Health Officer.

Montgomery, April 10th, 1889.

QUARANTINE CONFERENCE.

CIRCULAR LETTER.

This Circular Letter is specially addressed to the health authorities of the several States most directly interested in the protection of the South against invasions of yellow fever. Copies of it will also be sent to the Governors of the several States referred to, and to the Mayors of some of the more important cities for their information, and with a view of enlisting intelligent interest in the undertaking herein explained.

Under a joint resolution of our General Assembly, the Governor of the State of Alabama has issued to the Governors of the States of Texas, Florida, Louisiana, Mississippi, South Carolina, North Carolina, Georgia, Tennessee, Kentucky, and Illinois, invitations to appoint delegates to a Quarantine Conference to be held in the city of Montgomery, beginning on Tuesday the 5th of March, next, and to continue for such number of days as the business in hand may render necessary.

About two weeks ago Dr. C. P. Wilkinson, President of the Board of Health of the State of Louisiana, addressed a Circular Letter to the health authorities of these same States, suggesting a similar conference to be held in the city of Jacksonville, Florida. I have been in correspondence with Dr. Wilkinson, and the assemblage of the proposed Conference in Montgomery meets with his approval.

The object of the Conference cannot be easily overrated. It is to formulate in a way that will command the confidence of the general public and of the civil and sanitary authorities of the States concerned, and in the light of our latest experience and information, the principles and regulations which should govern our Southern Quarantines, and at the same time to arrange such plans for harmony and concert of action as may seem practicable and desirable.

It is earnestly desired that all of the States included in the invitation shall be represented in the Conference by full delegations of such of their citizens as are best fitted to discuss the theoretical and practical problems involved in the rational administration of quarantine in the South. The occasion ought to be made a very memorable one.

The Conference proper will be composed exclusively of the duly accredited delegates of the States; but other persons interested in quarantine matters will be heartily welcomed to seats on the floor, and to take such part in the discussions as under the circumstances may seem expedient.

To facilitate the work of the Conference, experts believed to be specially qualified, will be requested to formulate in advance for discussion, a series of propositions covering the subjects of maritime quarantine, railroad quarantine, municipal quarantine, depopulation of infected towns, refugee camps, panics, stampedes, disinfection, health certificates, etc.

We desire the assistance and co-operation of all who have had experience in the management of quarantines, and of all who have studied the progress of epidemics of yellow fever. Suggestions through the mails will be thankfully received.

All persons receiving this Circular Letter will confer a favor by acknowledging its reception, and notifying us what themselves and the communities they represent can be depended on to contribute to the success of the Conference.

Address all communications to

JEROME COCHRAN, M. D.,

State Health Officer.

MONTGOMERY, ALA., January 10th, 1889.

PROCEEDINGS OF THE QUARANTINE CON-
FERENCE HELD IN THE CITY OF
MONTGOMERY, ALABAMA,
March 5th, 6th and 7th, 1889.

The Quarantine Conference met in the hall of the house of representatives at the capitol at 10 o'clock a. m., March 5th, 1889.

The Conference was called to order by Dr. Jerome Cochran, State Health Officer of Alabama, and the meeting opened with prayer by Rev. J. L. Thompson, of the Adams Street Baptist Church, Montgomery.

Dr. Cochran addressed the Conference briefly, stating that he had expected Governor Seay to be present and deliver an address of welcome. He had been informed that the governor was unwell and not able to be present. Dr. Cochran assured the delegates that Montgomery was glad to have them in her borders, and that they would meet a warm and generous welcome among her people. He stated that the work to be done by the Conference would be of great importance to all the southern states. He wanted the Conference to cover the ground and complete the discussion whether it took three days or a week.

Dr. Cochran then nominated Dr. John H. Rauch, of Illinois, for temporary president of the Conference, and Dr. E. J. Conyngton, of Decatur, Alabama, for temporary secretary. He put the motion and they were unanimously chosen as temporary officers.

On taking the chair Dr. Rauch stated that the Conference was ready for business, and inquired the will of the body.

Dr. P. Thompson, of Kentucky, moved that a committee of five (5) be appointed on permanent organization. The motion prevailed, and the committee was appointed by the chair as follows, viz:

Dr. P. Thompson, of Kentucky, Dr. R. P. Daniel, of Florida, Dr. Thos. F. Wood, of North Carolina, Dr. J. D. Plunket, of Tennessee, and Dr. Jerome Cochran, of Alabama.

Upon motion of Dr. Cochran, the Conference took a recess until 11 o'clock to enable the committee to formulate their report.

At 11 o'clock the Conference was called to order by Dr. Rauch, and heard the following report from the committee on permanent organization :

MINUTES OF COMMITTEE ON PERMANENT ORGANIZATION.

Your committee beg leave to report the following gentlemen as accredited delegates to the Southern Quarantine Conference, viz :

Roll of Delegates of the Southern Quarantine Conference
held in the city of Montgomery, Alabama, on the
5th and 6th, and 7th of March, 1889 :

ALABAMA :—

Mr. Theodore Welch, general transportation agent, L. & N.
R. R., Montgomery.

Mr. B. C. Epperson, superintendent M. & M. R. R.,
Montgomery.

Col. W. S. Reese, mayor, Montgomery.

Dr. Jerome Cochran, Montgomery.

Dr. S. D. Seelye, member state board of health, Mont-
gomery.

Dr. J. S. Weatherly, member state board of health, Mont-
gomery.

Dr. T. A. Means, secretary state board of health, Mont-
gomery.

Col. J. C. Clarke, Mobile, vice-president M. & O. R. R.

Dr. C. H. Franklin, member state board of health, Union
Springs.

Dr. W. H. Hutton U. S. M. H. S., Mobile.

Dr. John B. Hammon, U. S. M. H. S., Surgeon General Ma-
rine Hospital Service.

FLORIDA :—

Dr. Richard P. Daniel, Jacksonville.
 Dr. J. T. Porter, Key West.
 Dr. J. D. Palmer, Fernandina.
 Dr. J. P. Wall, Tampa.
 Dr. W. H. Ross, Pensacola.
 Dr. T. J. Williamson.
 Mr. Joseph Voyle, Gainesville.
 Mr. J. E. Ingraham, Sanford.
 Mr. Wm. B. Henderson, Tampa.
 Mr. W. K. Hyer, Pensacola.

GEORGIA :—

Dr. J. B. S. Holmes, Rome.
 Dr. S. C. Benedict, Athens.
 Dr. James B. Baird, Atlanta.
 Dr. W. D. Bizzell, Atlanta.
 Dr. J. McF. Gaston, Atlanta.
 Dr. E. Burkley, Atlanta.
 Dr. J. A. Dunwoody, Brunswick.
 Dr. W. B. Burroughs, Brunswick.
 Dr. Eugene Foster, Augusta.
 Dr. J. C. L. Hardy, Savannah.
 Dr. E. G. Ferguson, Macon.
 Mr. E. T. Charlton, Savannah,

ILLINOIS :—

Dr. John H. Rauch, secretary state board of health.
 Dr. B. F. Griffith.
 Dr. R. E. Starkweather.

KENTUCKY :—

Dr. J. N. McCormick, secretary state board of health.
 Dr. P. Thompson, president state board of health.
 Dr. Wm. Bailey, member state board of health.
 Dr. J. O. McReynolds.

LOUISIANA :—

- Mr. B. R. Freeman, New Orleans.
- Dr. J. W. Dupree, Baton Rouge.
- Dr. C. M. Smith, Franklin.
- Dr. Robert Layton, Monroe.
- Dr. W. G. Austin, New Orleans.
- Dr. Clement P. Wilkinson, president state board of health.

NORTH CAROLINA :—

- Dr. Thomas F. Wood, secretary state board of health, Wilmington.
- Dr. R. F. Gray, Winston.
- Dr. T. A. Allen, Hendersonville.
- Dr. Joseph F. Harrell, Whiteville.
- Mr. J. L. Ludlow, C. E., member state board of health, Winston.
- Mr. Joseph E. Robinson, Goldsboro.
- Mr. James Norfleet, Henderson.

MISSISSIPPI :—

- Dr. J. M. Taylor, Corinth.
- Dr. R. S. Toombs, Greenville.
- Dr. G. W. Trimble, Grenada.
- Dr. W. F. Hyer, Meridian.
- Dr. O. R. Early, Columbus.

SOUTH CAROLINA :—

- Dr. T. Grange Simons, Charleston.
- Dr. H. B. Horlbeck.

TENNESSEE :—

- Dr. J. D. Plunket, president state board of health.
- Dr. G. B. Thornton, Memphis.
- Dr. John E. Black, president Memphis board of health.
- Hon. R. P. Hadden, Memphis.

TEXAS :—

Dr. Robert Rutherford, state health officer.

Dr. L. A. Pires.

VISITING GUESTS.

Dr. Victor M. Vaughn, Michigan.

Dr. George M. Sternberg, U. S. A., Baltimore, Maryland.

Dr. D. M. Burgess, U. S. sanitary inspector, Havana.

Dr. T. C. VanBibber, Baltimore, Maryland.

We also beg leave to report the following recommendation for permanent officers :

For President—Dr. C. P. Wilkinson, Louisiana.

For Vice-Presidents—Hon. David P. Haddon, Tennessee, Dr. T. Grange Simons, South Carolina, Mr. E. Berkeley, Georgia, Dr. William Bailey, Kentucky, Mr. J. C. Clark, Alabama, Dr. Robert Rutherford, Texas, Dr. J. Y. Porter, Florida, Dr. R. F. Gray, North Carolina, Dr. B. M. Griffith, Illinois, Dr. J. M. Taylor, Mississippi.

Secretaries—Dr. J. N. McCormack, Kentucky, Mr. J. L. Ludlow, C. E., North Carolina, Dr. J. B. Baird, Georgia.

RULES OF ORDER.

1. Each state shall be allowed ten votes, whenever a division is asked on any pending motion, said votes to be divided according to the pleasure of the delegation, and to be announced by the chairman of the delegation.

2. Where no division is asked for the votes shall be by ayes and noes.

3. In all discussions each speaker shall be limited to ten minutes.

We recommend that all visiting gentlemen who do not come accredited by certificates of delegation from Governors of their states, but who are specially interested in the purposes of the call of this Conference, be invited to participate in all the privileges of this body, except that of voting.

Order of Discussion of Subjects :

Maritime Quarantine.

The papers of Dr. D. N. Burgess, U. S. Sanitary Inspector at Havana.

And Dr. Wilkinson, President Louisiana Board of Health.

Inland Quarantine.

Rail Road Quarantine.

Local Management of Epidemics.

The report of the committee was unanimously adopted.

On motion, a committee of two was appointed to conduct Dr. Wilkinson, the permanent President, to the chair. On taking the chair Dr. Wilkinson expressed sincere thanks to the Conference for the honor conferred in making him President, which he took as a compliment to the State Board of Health of Louisiana, rather than a personal honor. His thanks were tendered in behalf of his colleagues, who were marching hand in hand with the gentlemen who composed the Conference, for the cause of quarantine and sanitary improvement.

On motion of Dr. Cochran, Gov. Seay, who had arrived and was present in the hall, was invited to address the Conference. The Governor was escorted to the Speaker's stand and spoke as follows :

THE GOVERNOR'S SPEECH.

Mr. President and Gentlemen of the Convention :

It would be an intrusion on your consecrated time to offer more than a few words of welcome.

You are here formally in answer to an invitation of the authorities of this State, but really in response to the profound invocation of humanity.

Pestilence has always been the great enemy of mankind, and the most favored nations have not been exempt from its havoc. Science and government have done much, very much, to diminish its ravages, and I do not doubt that they will yet be sufficient to destroy it altogether. The last great enemy is death, and if it shall come under the foot of man, the honor will lie at the feet of science.

Again, gentlemen, I acknowledge my own pleasure in welcoming you to this place and invoking success on your councils.

Dr. T. Grange Simons was called to the chair, and Dr. L. P. Wilkinson, the President, read the following paper on "Maritime Quarantine Services of the Southern Sea Ports." [See Appendix II.]

Upon motion, the paper of Dr. Wilkinson was received by the Conference, to be referred to an appropriate committee to be appointed.

Upon motion of Mr. B. R. Foreman, the Chair appointed a Committee on Business, consisting of one member from each state represented and one each from the U. S. A. and the U. S. M. H. S., to whom all papers, propositions and resolutions shall be presented, and who shall prepare a program of order of business.

The committee was named by the Chair as follows, viz:

Alabama.	Dr. Jerome Cochran,
Florida.....	Dr. R. P. Daniel,
Georgia	Dr. W. D. Bizzell,
Kentucky	Dr. J. D. McReynolds,
Louisiana.	Dr. J. W. DuPoe,
Mississippi.....	Dr. R. S. Toombs,
North Carolina....	Dr. Thos. F. Wood,
South Carolina....	Dr. T. Grange Simons,
Tennessee	Dr. J. D. Plunkett,
Texas	Dr. R. Rutherford,
U. S. A.....	Dr. G. M. Sternberg,
U. S. M. H. S.....	Surg. Gen. J. B. Hamilton.
Illinois.	

NOTE.—After one meeting of this committee, Dr. Cochran declined to serve on it any longer; and his place was taken by Dr. M. C. Baldrige, President of the Alabama State Board of Health.

Adjourned.

AFTERNOON SESSION. FIRST DAY.

Called to order by President Wilkinson at 3 p. m. Report of Committee on Business was presented by Dr. Thomas F. Wood of N. C., as follows:

COMMITTEE ON BUSINESS

beg leave to submit the following:

Hours of meeting from 10 to 1.30 A. M.; 3.30 to 6 P. M.; 8 to 10 P. M.

Order of Business.

1. Reading Minutes.
2. Reports of Committees.
3. Reading of Papers.
4. Discussion of Papers.
5. Unfinished Business.

The following papers ordered for Afternoon Session, 5th March:

Paper by Mr. J. C. Clarke, V. P. M. & O. R. R., on "Railway Quarantine."

One by Dr. VanBibber, on "Quarantine of the Future."

One by Mr. Voyle, on the "Epidemic of Yellow Fever in Gainesville, Fla., and the Deductions therefrom.

The report was adopted.

Dr. G. B. Thornton of Tenn. read the following paper, by Col. J. C. Clarke of the Mobile & Ohio R. R., on Rail Road Quarantine. [For paper, see Appendix III.]

By motion, the paper was received and referred to a Committee on Quarantine to be provided.

Upon motion of Dr. Eugene Foster (Ga.), a committee was appointed by the Chair, consisting of one delegate from each of the States represented, and the U. S. M. H. S., to whom all papers relating to Quarantine and all propositions relating thereto, should be referred.

Committee named by the Chair as follows, viz :

Alabama.....	Dr. E. J. Conyngton,
Florida.	Dr. J. P. Wall,
Georgia	Dr. Eugene Foster,
Illinois.....	Dr. B. M. Griffith,
Kentucky.....	Dr. P. Thompson,
Louisiana	Dr. C. M. Smith,
Maryland	Dr. W. C. Van Bibber,
Mississippi	Dr. W. F. Hyer,
North Carolina.....	Dr. Thomas F. Wood,
South Carolina.....	Dr. H. B. Horlbeck,
Tennessee.	Dr. G. B. Thornton,
Texas	Dr. L. A. Pires,
U. S. M. H. S.....	Dr. W. H. H. Hutton.

The next business of the Conference was the reading*of the paper by Mr. Joseph Voyle of Fla., on the "Epidemic of Yellow Fever at Gainesville, Fla., and the Deductions therefrom." [For paper, see Appendix IV.]

Conference adjourned.

NIGHT SESSION. FIRST DAY.

Called to order by President Wilkinson at 8.30 P. M. The Committee on Business presented its report by a series of topics for discussion.

Upon motion of Dr. Wood (N. C.), the topics were read and discussed singly.

TOPIC I. What form of notification shall be adopted in case of occurrence of yellow fever? To whom shall the first notification be sent?

Dr. Thompson said that a conference which met at Memphis in 1878 formulated a set of rules which ought to be adopted all around. By this set of rules it was the duty of every health

officer to notify the State health officer and the local officers. He thought that when a case of fever appeared at any one place, every place in the State or in the section ought to know it as quick as lightning.

Dr. McCormack of Kentucky explained that at a quarantine conference held at Toronto some time ago, the health officers of all the State health boards in the Union had agreed to a blank form of notification to be sent to every other health officer, and he knew of no single instance where the pledge or agreement had been violated. The pledges extended to small-pox and every contagious or infectious disease.

Dr. Wilkinson said the question of notifying health boards was a serious question, and one that ought not to create unnecessary alarm. He was opposed to notifying anybody except officers of the health boards of occurrence of a case or suspicious case of any disease included in the resolution.

Dr. Simons thought the United States Marine Hospital Service ought to be included in the resolution, and made a motion to that effect.

The resolution was carried.*

Dr. Thornton—A number of members of boards of health now here are already pledged, in honor bound, by the rules of quarantine conferences of 1879 and 1884, to notify each other whenever a case, not only of yellow fever, but even a suspicious case occurs. He thought every health officer in this country and in Canada should be officially notified, for it was an international affair. Dr. Holt, of New Orleans, and Dr. Wirt Johnson, of Mississippi, had both given notice officially whenever cases of fever or suspicious cases had appeared in their fields and come to their notice. He thought notice, official notice of occurrence of cases or suspicious cases, ought to be sent to everybody interested. The question arose as to whether the notification ought to be sent by open or cipher telegram, and he was of the opinion that open telegrams ought to be sent.

Upon motion of Dr. Cochran, the following was adopted as the sense of Conference in answer to Topic I:

*No resolution in copy.

Resolved, That this Convention urges upon all health authorities of States represented in it the importance of strict compliance with the agreement of inter-state notification adopted by the National Conference of State Boards of Health, and the Sanitary Council of the Mississippi Valley, in regard to all communicable diseases, and especially in regard to yellow fever.

TOPIC 2. Under what circumstances should an epidemic be declared to exist?

Dr. Thompson said that the question had been asked many a time, and no satisfactory answer had ever been given. The universally adopted thought was that when a number of deaths occurred in any town from one disease, or a large number had been taken sick, that was an epidemic.

Dr. Thornton stated that he once had an occasion to decide this question of when an epidemic existed. During the summer of 1878, when the fever appeared in Memphis, there was a considerable number of cases before he was inclined to believe it was epidemic. He had never officially announced to the world that yellow fever was epidemic until deaths from that disease were more than from all other diseases.

The question was, on motion of Dr. Rauch, laid on the table.

TOPIC 3. Should we advise the depopulation of any place on the appearance of yellow fever, and if so, how soon?

Dr. Thornton was opposed to depopulation.

Dr. Cochran would not advise depopulation on the occurrence of one case or even of a dozen cases. If a case appeared in a portion of a town he would advise the depopulation of the adjacent houses and districts, but he was opposed to depopulating whole towns and cities, for such a course resulted in panic and stampedes and this Conference ought to rebuke this course severely. When the yellow fever overstepped all bounds it would be time to talk of depopulating towns, but

he believed the fever could be kept in bounds and had no business ever getting out.

Dr. Wood thought the Conference ought to say distinctly when it was advisable for depopulation to commence. He had no idea but that every physician in the Conference would advise some patients to get out in time of yellow fever.

Dr. Hyer said that there need be no trouble about advising a man to get out of town in time of yellow fever, for when you went to tell him he wouldn't be there unless all the wagons had gone before. The trouble was in getting people to stay.

Dr. Cochrane said this thing of depopulating whole towns when a few cases appeared, brought great mischief. He believed the time was coming when yellow fever would be so completely under the control of physicians that when a special house or district was infected the people would not rebel.

Dr. Thornton moved to refer the question of depopulation to the people of the towns interested.

Mr. Voyle said depopulation had bankrupted Gainesville, Fla. The people ought to be educated to take care of themselves, until this question could be settled. He described all the terrors that existed there during the epidemic of last summer.

Dr. Sternberg said depopulation was one thing and a stampede was another. The first thing to be done in an infected locality was to remove well people from infected districts so as to keep them from exposure. He thought the Conference ought to adopt a resolution that depopulation of infected areas by health officers was an important step in checking the progress of the disease and made a motion to that effect.

Dr. Hamilton seconded Dr. Sternberg's motion, and gave the history of several cases of yellow fever cases in Baltimore in 1886, when the whole city was spared an epidemic by the depopulation of a block.

Dr. Cochrane said that the Conference was disposing of a very important question in a short time. The following propositions covered the question :

(1) In the beginning of an outbreak of yellow fever there is no need of depopulation at all except of infected houses or infected districts; but if people who are able to afford the expense desire to leave they should do so quietly and deliberately, and no obstacles should be placed in their way; and those who leave healthy districts of the city or town should go wherever they please without let or hindrance.

(2) Persons living in infected houses or in infected districts, should be encouraged to leave, but should be allowed to leave only under such restrictions as will afford reasonable guarantee of safety to the communities in which they find asylum; and they should be sent only to such communities as are willing to receive them.

(3) In the depopulation of infected houses or of special infected districts the inhabitants should be removed into camps of probation, or into vacant houses in the adjacent country. After five days detention if they remain well, and under proper regulations, such as disinfection of baggage, they should be considered free from danger, and allowed to go freely into any community willing to receive them.

(4) The depopulation of large cities is altogether impracticable. The depopulation of sparsely settled towns and villages is altogether unnecessary, as in them it is always possible to prevent any general spread of the fever.

(5) Refuge camps, that is to say camps for the continued residence of people during the prevalence of epidemics, have heretofore been of very small value. One reason for this is, that it is never possible to induce any considerable proportion of the population of an infected city to take refuge in the camps. Camps of probation for temporary detention, may often be very useful.

(6) Panics and stampedes are always without excuse and at the same time excessively mischievous. At the beginning yellow fever always spreads slowly, and there is always time for everybody who desires to leave an infected place to do so without hurry and under proper regulations.

Dr. Weatherly thought Dr. Cochran was eminently right.

Dr. Thompson said that Dr. Sternberg's resolution was a very good thing in theory, and was doubtless drawn under the impression that the health officers had powers to depopulate towns. If there was a place in the country where such power existed he had never heard of it. There was no power on earth to make a man get out of his own house when he did not want to. You could make him stay in, but when it came to making him get out that was a different thing.

Dr. Seelye said the resolutions would be interpreted by health boards very indefinitely, and offered as a supplement to Dr. Sternberg's resolution the first three propositions submitted by Dr. Cochran.

Dr. Sternberg accepted the suggestion of Dr. Seelye as a substitute for his motion.

Dr. Bailey thought the putting of people in camps of detention and keeping them there five days was unwise. Coming from a section that had shown it was anxious to welcome refugees he would much rather have refugees who stood not on the order of their going. He thought depopulation in cases of yellow fever was wise and practicable. Yellow fever was the best thing in the world to run from.

Dr. Cochran did not think any prudent people would care to have people taken out of infected houses or squares amongst them. As to refugee camps, people generally would not go to them, never had gone to them and could never be expected to go to them.

Dr. Horlbeck thought the time of probation ought to be ten instead of five, and a motion was made to that effect. Carried.

Dr. Rutherford said he could not leave the time of probation five days; he could not go back to Texas if he voted for that proposition.

Dr. Cochran said we were not here to represent the views of our constituents like members of a legislature; our mission here was to give the people the benefits of scientific researches which would control legislation and public opinion.

The following resolutions offered by Dr. Seelye were then adopted as the sense of the Conference as the answer to Topic 3 :

Resolved, In the beginning of an outbreak of yellow fever there is no need of depopulation at all, except of infected houses, or infected districts; but if people who are able to afford the expense desire to leave they should do so quietly and deliberately, and no obstacles should be placed in their way; and those who leave healthy districts of the city or town should go wherever they please, without let or hindrance.

(2) *Persons living in infected houses, or in infected districts should be encouraged to leave, but should be allowed to leave only under such restrictions as will afford reasonable guarantees of safety to the communities in which they find asylum; and they should be sent only to such communities as are willing to receive them.*

(3) *In the depopulation of infected houses or of special infected districts, the inhabitants should be removed into camps of probation, or into vacant houses in the adjacent country. After ten days detention, if they remain well, and under proper regulations, such as disinfection of baggage, they should be considered free from danger, and allowed to go freely into any community willing to receive them.*

Conference adjourned.

MORNING SESSION—SECOND DAY.

Called to order by President Wilkinson at 10 A. M. The committee on quarantine presented its report through its chairman, Dr. Eugene Foster, of Georgia.

Upon motion, the report was read and discussed, section by section, as follows :

Your committee respectfully report the following in relation to the paper of Mr. Clark :

That section I should read—

There should be uniform rules adopted for the management of quarantines as far as practical, but no freight shall be received from an infected place, though freight and passengers should be allowed to pass through an infected place without stopping.

Upon motion of Dr. Cochran, the following resolutions were adopted as the sense of the Conference in lieu of Section (1) above :

Resolved, During the prevalence of yellow fever epidemics, passengers and freights should be brought from infected local-

ities only under such regulations and restrictions as may be established by the state health authorities along the lines of the roads concerned.

(2) *The regulations and restrictions governing railroad transportation during yellow fever epidemics should be of such a character as to afford all reasonable guarantees of protection to the communities in danger of invasion by the disease, but should not be more onerous than the circumstances warrant, and should be framed with due consideration of the extent and character of the danger in each particular case, and as affected by latitude and seasons of the year, and other qualifying conditions.*

(3) *At all seasons of the year, and under all circumstances, the simple passage of railroad trains should be allowed, without obstruction, even when carrying sick refugees from infected places to healthy localities willing to receive them.*

SEC. 2. *A well-digested quarantine formula, making and promulgating the necessary rules and regulations for enforcing the same, should be prepared, ready to be put in force when necessary to do so, at all points where it is necessary to put quarantine in force. These rules should be published for general information, to enable all persons to comply with the same, and displayed by placard in every depot.*

Upon motion, Section (2) was adopted as the sense of the Conference.

SEC. 3. *At quarantine stations accommodations should be provided for caring for such persons, if any, as may be detained or are not permitted to pass through such stations, while in transit, until they can be disposed of.*

Upon motion, Section (3) was adopted as the sense of the Conference.

SEC. 4. *Only competent physicians, who have had experience with contagious and infectious diseases, should be made inspectors at quarantine stations, whose duty it shall be to inspect and examine the condition of passengers, baggage and express matter. All inspectors should have the power to administer oaths, and to remove from the trains, and detain at quarantine stations such passengers, baggage or express matter, &c., as may be found necessary to prevent the introduction or spread of infectious or contagious diseases of any kind.*

Upon motion, Section (4) was adopted as the sense of the Conference.

SEC. 5. This committee recommend that section 5 be not adopted.

Upon motion, Section (5) above of committee report was rejected, and the Conference adopted Section (5) of Mr. Clark's paper, as follows :

5. State boards of health should be the powers authorized to put quarantine in force. They should determine when, where and for what length of time quarantines should be maintained; provide the means necessary for enforcing the same, and promulgate rules and regulations for conducting quarantines.

Presidents and secretaries of state boards should be required to visit and inspect all quarantine stations, as often as practicable, during the existence of such quarantines; and to make public, over their signatures and official positions, the general condition of the public health at the points where quarantines are established, and the localities affected by such quarantines. Local health officers, municipal or county authorities, may establish quarantine regulations, conferring with the state board, if deemed necessary, for co-operation. The regulations for governing local quarantines should not be in conflict with the rules and regulations adopted by the state boards of health for enforcing quarantine regulations.

SEC. 6. *The refuge stations as at present operated on the sea-coast of the United States are, in the opinion of this body, of infinite service, and we would recommend their continuance in a full equipment for all requirements.*

A substitute was offered by Mr. Foreman of Louisiana in lieu of Section (6); which, on motion, was tabled. For substitute, see Appendix V.

Upon the resolution of Mr. Foreman, Dr. Austin of Louisiana, upon personal privilege being granted by the Conference, spoke as follows: See Appendix VI.

Substitute offered by Dr. Thompson of Kentucky, in lieu of Section (6).

Resolved, That it is the sense of this Conference that it is the duty of the Government of the United States to take charge of the entire maritime quarantine service of this country, and to devise and execute such a system as will protect the country against the introduction of contagious and infectious diseases.

On motion, substitute was tabled.

Upon motion, Section (6) of committee report, as above, was adopted as the sense of the Conference.

SEC. 7. When any suspicious case occurs, the nature of which has not or can not be determined at its then present stage, or doubts arise as to the nature of the case, wise precaution demands that such case be immediately isolated from contact with all other persons until medical science has diagnosticated the case, and is able to determine the nature of it, beyond doubt. When conclusions are reached they should be made public.*

Substitute for Section (8) of Mr. Clark's paper:

Experience has proven that by proper precautions, closed cars bearing passengers or freight may be run through infected localities without danger of infection.

By motion of Dr. Cochran, Section (8) of report was laid on the table, its purpose having been accomplished by another resolution.

SEC. 9. In the depopulation of infected houses, districts or cities, inhabitants should be removed into camps of probation, or into vacant houses in the adjacent country. After twelve days detention, if they

* It is not stated what was done with Sec. 7.

remain well, and under proper regulations, such as disinfection of baggage, etc., they may be discharged from surveillance.

Section (9) was, upon motion, tabled—its purpose having already been passed upon and decided.

SEC. 10. *Rail Road agents on roads under quarantine surveillance at way stations should be required to refuse to sell tickets to any persons who can not show that they have not in twelve days been exposed to any source of infection, and conductors should be required by law to refuse to transport passengers from way stations who are not supplied with tickets.*

Upon motion, Section (10) of committee report was adopted.

SEC. 11. *Health certificates should be required from all persons whenever yellow fever prevails in this country. They should be issued only by the health official in charge of the place, under official seal, or, in the absence of such seal, under the seal of the municipal or county court where the certificate originates. In each certificate the person to whom it is issued should be so described as to admit of his identification, and should state the facts of the case fully and circumstantially. And to such certificates full credence should be given by all health authorities. We must have honesty and mutual confidence amongst those charged with the protection of the public health.*

A uniform system of certificates should be adopted by boards of health. We would recommend the following form :

....., (Office of the Board of Health.)
(Date.)

Health Certificate.

Name.....
 Residence.....
 How long in.....
 Destination.....

Dr. W. F. Hyer.....Mississippi,
 Dr. T. Grange Simmons...South Carolina.

Upon motion, Conference adjourned.

AFTERNOON SESSION—SECOND DAY.

Called to order by President Wilkinson at 3.30 P. M. Conference resumed discussion of topics presented by Committee on Business.

TOPIC 4. Is it practicable to cause depopulation of large cities?

Tabled, having already been acted upon.

TOPIC 5. Are probation camps desirable? By whom should they be managed and supported? What period of time should elapse from the time of arrival at the camp until the granting of free pratique?

Tabled, having already been acted upon.

TOPIC 6. On the occurrence of a case of yellow fever, what immediate measures of isolation are desirable?

Upon motion of Dr. Cochran, the following resolutions were adopted as the answer to TOPIC 6:

Resolved, 1st, When one case or a few cases of yellow fever occur in any community, it does not follow of necessity that the disease must spread and become epidemic. On the contrary, the experience of many countries through long periods of time shows conclusively that in the majority of such instances, and without the observance of any special means of prophylaxis, the disease fails to spread.

2d, When one case or a few cases of yellow fever occur in any community, in the light of our present knowledge of the

habits and modes of propagation of the disease, it is generally possible, by the employment of the proper prophylactic measures, to prevent the development of an epidemic.

3d, *The golden rule for the prevention of yellow fever is non-intercourse—isolation—the keeping of the well away from the sick, away from infected things, and very especially away from infected localities.*

4th, *In the enforcement of this golden rule of non-intercourse two problems present themselves for solution. (a) To keep the people generally from coming into the infected houses and the infected localities; and (b) to keep doctors and nurses and other attendants, and the well members of sick families, from visiting and mingling with people outside of the infected houses and localities. The solution of the first of these problems is comparatively easy. The solution of the second is sufficiently difficult. But it is possible to solve them both.*

5th, *In the densely settled sections of cities guards may be useful for the enforcement of non-intercourse. They are much less needed in sparsely settled towns. In villages and country neighborhoods, as a rule, they are not needed at all. In all cases every intelligent family should be able to take care of itself—should be able to keep all of its members away from infected houses and localities, and to guard its own premises from invasion by dangerous persons and things.*

6th, *Non-intercourse may be practiced in the very centre of an infected district with considerable probability of escaping the fever. Cloistered convents and prisons in infected cities, with yellow fever raging all around them, usually escape invasion; and there are numerous instances on record in which private families in the midst of epidemics have passed the ordeal safely by the rigorous enforcement of non-intercourse.*

TOPIC 7. What means of disinfection should be adopted for chambers and dwellings where cases of yellow fever have occurred?

Dr. Cochran moved the following resolutions in answer to
 TOPIC 7:

1. Disinfection in yellow fever is based very largely on theoretical grounds. Nevertheless we believe that it may be made a valuable agent in checking the spread of the disease. In the beginning of an outbreak all the resources of disinfection should be exhausted, and these efforts should be continued until the epidemic is fully established. After the epidemic has subsided, disinfection is of very questionable value.

2. The disinfecting agents most to be trusted are heat, especially moist heat; cold, both artificial and natural, and especially cold weather and frost; and certain chemicals, especially the bichloride of mercury and the fumes of burning sulphur. To these must be added ventilation.

3. The disinfection of beds, bedding, clothing, and articles of similar character, is comparatively easy. The disinfection of single rooms, and perhaps also of single houses, is more difficult but not entirely impracticable. The disinfection of yards must be regarded as very difficult, but in the beginning of an outbreak it should be attempted. The disinfection of a whole city, or even of a large section of a city, seems not to be practicable.

Dr. Simons said the adoption of the resolutions would commit this Conference to a very bad thing.

He thought that sanitarians had differed widely on the subject of disinfection, and moved to strike out the last sentence of the first resolution. Carried. Continuing his speech to the Conference, Dr. Simons said the Conference ought to allay public feeling, and ought to feel the commercial pulse. He moved to strike out the last section of the second resolution.

Dr. Daniel seconded the motion in a short speech. He said that disinfection did a great deal towards controlling the moral demoralization of the people.

Dr. Sternberg said that yellow fever was brought to America from Havana or other places. The disease was a something to be destroyed, and he thought the effort to destroy it ought at least to be made. Everything indicated that the yellow fever germ was not very hardy and could easily be killed. He thought it a little less than criminal for health boards to leave anything in the way of disinfection at the beginning or during any part of the epidemic. (Applause.)

Mr. Voyle related his experience at Gainesville, Fla., during the epidemic of last summer.

Dr. Plunkett moved to strike out the first and last resolutions.

Dr. Bailey thought the profession differed very materially on the question of disinfection.

Dr. Vaughan said that disinfection was, in some diseases, especially in scarlet fever and diphtheria, a sure means of preventing the spread of infection or contagion, and was even better than quarantine. It was going to be one of the greatest methods of limiting diseases in future.

Dr. Cochran said that disinfection was a question of great importance. He agreed with Drs. Sternberg and Vaughan. He was not opposed to disinfection, but the amount of good it had accomplished in epidemics of yellow fever was very questionable. He said the only place thoroughly disinfected in his knowledge was Plant City last summer, but even there it failed. After refugees were allowed to return the disease broke out again in a few days. Whenever infection appeared he was heartily in favor of going for it and using every means in the world to stamp it out. He thought post epidemic disinfection unnecessary, and moved to refer the whole subject matter to a committee to be appointed by the chair. Lost.

The following resolutions introduced by Dr. T. Grange Simons, of South Carolina, and Dr. Thos. F. Wood, of North Carolina, was adopted as the sense of the Conference in answer to Topic 7.

Resolved, That this Conference recommend that all approved methods of disinfection by means of personal and municipal cleanliness, by ventilation, fumigation, chemical affusion, destruction by fire of all infected or suspected things used during an epidemic of yellow fever and until the danger of its spread shall have passed, and that all fomites should be disinfected after the recovery of the sick.

We recommend as a basis of disinfection the processes as set forth by the Committee on Disinfectants, of the American Public Health Association.

Mayor Hadden, of Memphis, offered the following :

Resolved, That Decatur, Alabama, be thoroughly disinfected at once, and that the proper authorities are requested to do so immediately.

Dr. Cochran said there was no use in adopting the resolution for he would assure the Conference that no such thing would be done.

Mr. Austin, of New Decatur, said he, in the name of the women and children and united people of Decatur had urged on the government, state and national, to burn the bedding and other things now lying in a hundred houses in the town where fever had raged.

He read a letter from Gov. Seay recommending that the United States government send an inspector there to see what ought to be done. He also gave a history of the Decatur boom. He said that the city of Decatur had appealed in the name of all that was dear to them, but not one had ever reached the heart of the state health officer. He said that he could make a statement to the floor that would melt a heart of stone.

Dr. Cochran said all the eloquence of the gentlemen was based upon the assumption that the poison of yellow fever was still lurking in the yards and houses, and amongst the bedding and clothing of the people in Decatur. But if the assumption was wrong the eloquence and pathos would be eloquence and pathos still, but they ought not to have any effect in controlling the suffrages of this Conference. All the facts went to show that there was not the shadow of proof—not a particle of evidence that the infection still existed in Decatur. If it did exist why didn't those people who went back after the epidemic ended have the fever? Was there a single person on this floor who believed that yellow fever infection remained in Decatur? The state of Alabama had the money to do the work asked for, and he had control of it, but he would cut off his right hand before he would do this work. The doing of it would only result in adding another horror to yellow fever, and it had enough already. If the Conference granted the appeal of Mr. Austin it would controvert the whole yellow

fever history of the world. He hoped the Conference would not be unduly moved by such appeals.

Mr. Voyle offered the following :

Resolved, That the city of Decatur can furnish a valuable example of the efficacy or otherwise of disinfection by omitting any further action in that direction, and that they can perform a patriotic act of humanity by such action.

Dr. Hyer, of Mississippi, thought the prayer of Decatur ought to be answered.

Dr. Bizzell was opposed to the adoption of a resolution impeaching the character of a health officer who had commanded the admiration of everybody. (Applause.)

Dr. Baird thought it would be discourteous to the state to censure her governor or state health officer.

Dr. Weatherly said that frost was the best disinfectant known.

Dr. Thornton said he was not going to take any part in the local fight about the city of Decatur, but he wanted to say a few words. He said that no man had ever stated or proved that yellow fever was imported to Memphis in 1879. It was his opinion that it had been nursed in bedding, mattresses, etc., which were left over from the epidemic of 1878. He thought Decatur ought to be thoroughly disinfected.

Dr. Bailey thought it would not be courteous to their host the state of Alabama, and moved to table the resolutions and amendments. Adopted.

TOPIC 8. What system of disinfection should be adopted for personal baggage of persons fleeing from an infected place?

Dr. Hamilton said that when the question of the escape of people from infected Florida came up last summer there was no time to prepare elaborate machinery for the disinfection of baggage. He detailed how baggage, etc., was disinfected in a box car at every crossing during the beginning of the Jacksonville epidemic, and later how a warehouse was constructed. He thought the government ought to construct cars with steel

chambers, with super-heated steam, so as to move from place to place as the exigencies of the case demanded. Such plans had already been filed at government headquarters, and he hoped to have the cars ready in case they should be needed.

Upon motion of Dr. Wilkinson, it was

Resolved, That it is the sense of this Conference, that the best form of disinfectant for personal baggage is moist heat.

Moved, that the hearing of the papers by Drs. Sternberg, Vaughn, Burgess, and VanBibber, be the next order of business for the Conference. Adjourned.

NIGHT SESSION—SECOND DAY.

Called to order by President Wilkinson at 8 p. m.

The following resolution, introduced by Col. J. C. Clark, of Alabama, was adopted :

Whereas, This Quarantine Conference has adopted the report of the Committee on Inland Quarantine ; therefore, be it

Resolved, That a committee of one from each state represented in this Conference be appointed to prepare rules and regulations for governing quarantines, when it becomes necessary to put the same in force. And that such rules be published when prepared for the information of the public, and all persons to be affected thereby. And that state boards of health and health officers of states be requested to furnish such rules to the proper officers of municipal and county authorities for their information.

Dr. Geo. M. Sternberg, U. S. A., read his paper on "Hunting Yellow Fever Germs" with magic lantern illustrations. For paper see Appendix VII.

By motion a vote of thanks of the states assembled was tendered Dr. Sternberg for the very entertaining address and exhibit with which he had favored the Conference.

Dr. Victor C. Vaughan, who had been announced to read a

paper, stated that owing to the lateness of the hour he would address the Conference briefly upon the subjects covered by his paper in lieu of reading the paper. Whereupon he addressed the Conference.

By motion a vote of thanks of the Conference in the name of the states assembled was tendered to Dr. Vaughan for his very interesting address.

By motion Drs. Sternberg and Vaughn were requested to furnish copies of their respective papers for publication with the Proceedings of the Conference. For Dr. Vaughan's paper, see Appendix VIII.

Adjourned.

MORNING SESSION—THIRD DAY.

Called to order by President Wilkinson 10 A. M. The Chair announced the committee proposed by Mr. Clark's resolution of the Wednesday evening session as follows :

Committee on Promulgation of Rules for Quarantine Management—

J. C. Clark.....	Alabama.
J. B. Baird.....	Georgia.
J. Y. Porter.....	Florida.
R. S. Starkweather.....	Illinois.
Wm. Bailey.....	Kentucky.
H. B. Horlbeck.....	South Carolina.
J. E. Black.....	Tennessee.
R. Rutherford.....	Texas.
R. F. Gray.....	North Carolina.
O. R. Early.....	Mississippi.
C. M. Smith.....	Louisiana.

Dr. Daniel M. Burgess, sanitary inspector M. H. S. at Havana, read the following paper on "The Sanitary Inspection Service at Havana, Island of Cuba." For paper, see Appendix IX.

Dr. Palmer, of Florida, desired that the paper be discussed by the Conference. He had heard the threat often that the

state of Florida would be cut off unless all intercourse between that state and Cuba was prohibited.

Dr. Daniel, of Florida, made a statement as to the danger of Florida, and asked Dr. Burgess several questions regarding the inspection at Havana.

Dr. Wilkinson took the floor and stated his experience as to the reliability of health certificates issued by United States consuls, and cited instances where the same consul had issued two certificates entirely different in nature, both issued the same day. Dr. Wilkinson then gave an outline of the methods of the Tampa quarantine in connection with the Plant steamship line, giving the requirements made of a passenger before he is allowed to land. He thought that it was useless to indulge in crimination or recrimination regarding the origin of yellow fever in Jacksonville; rather let Tampa quarantine be considered, and let it be shown whether or not it would be possible to introduce fever into Tampa by the Plant line of steamers in spite of the Tampa quarantine?

Dr. Wall had given the subject of the Tampa quarantine much study, and he was satisfied that it is not shown that a single case of fever was ever brought into Florida by the steamers of this line. No quarantine is perfect, but the Tampa quarantine was as good as any in existence.

Mr. Ingraham, representing the Plant line, made a statement to the Conference of the methods in use on the steamers on that line to prevent the possibility of bringing the germs of yellow fever to this country. He detailed the construction of the vessels used and the measures of fumigation to which all baggage is subjected. He stated that the company had more than one thousand claims for damage done to fine clothing by the fumigation. He concluded by assuring the Conference that the Plant system did not desire to endanger the health of the entire country, and if it was so regarded the company would discontinue its steamers.

Dr. T. Grange Simons, of South Carolina, thought that disinfection was in a state of experiment, and at this time the

only point at which this system is in any way perfect is at New Orleans. He did not think there was any assurance that the Plant system of fumigation was at all times enforced.

Dr. Cochran thought that the Plant system had done more than any line of vessels coming to this country. He was of the opinion that rather than increase the restrictions of the company they should be relaxed ; that it is doing much more than is done on any line of vessels going to New Orleans. If anything is done to further protect this country, it should be at the port, and he suggested that a fumigation or disinfectant station be established at Tampa. He thought that a legitimate route or line of travel between Cuba and the United States would tend to decrease the probability of introduction of disease into this country.

Dr. Porter followed, giving a detailed history of the appearance of yellow fever into Key West in 1887, and the manner of its introduction. He reverted to the Plant steamers, and gave it as his opinion that those vessels were so constructed as to render them very easily cleaned. Something had been said about Dr. Nelson's "blue suit" which he wore from Havana to Tampa without disinfection. Dr. Porter said the suit which he was wearing had been many times in contact with yellow fever patients. It had never been fumigated, but still it had been aired, and there was absolutely no danger in it now, and no more was there in Dr. Nelson's blue suit.

Dr. Hamilton followed, giving an outline of the working of the consular weekly report system, with a few items of the cost of obtaining information by cable and the extreme difficulty of consuls to obtain correct information. He stated that the Spanish government at first objected to placing Dr. Burgess as a yellow fever inspector at Havana, and that he was only allowed to remain at the earnest solicitation of the secretary of state. He spoke of the need of physicians being attached to the consulates in countries in which epidemic diseases are endemic, and he hoped the Conference would adopt a resolution calling on congress to take this action. He favored the appointment of inspectors at every port of entry in the coun-

try, and the increase of inspectors, but he did not think it would be necessary to establish more quarantine stations. He would recommend under the new quarantine law, that when a vessel reached any port in this country in a filthy condition, it would be subjected to ordinary fumigation, and in the event of the second arrival of the same ship within a year, in a filthy condition, it would be subjected to an extraordinary fumigation. The cost of these fumigations would cause the vessel owners to be more careful as to the cleanliness of their vessels. He had visited the vessels which brought yellow fever to Pensacola the last time that disease was brought there, and he had found it the filthiest ship he had ever seen. Dr. Hamilton then gave an outline of the proposed quarantine stations at Dry Tortugas and the Pacific coast.

Dr. Wilkinson introduced the following resolution, which was unanimously adopted as the sense of the Conference. The resolution read as follow :

Be it Resolved, That the secretary of the Treasury of the United States is hereby requested to increase the revenue patrol service on the coast of Florida to such extent as may be necessary to prevent smuggling.

The following resolutions, introduced by Drs. Wood and Foster, were adopted :

BY DR. WOOD OF NORTH CAROLINA.

WHEREAS, *It appears by the report which Dr. Burgess has made to this conference, that sanitary inspection of vessels where yellow fever is endemic is of vital importance, therefore be it*

Resolved, That this conference approves the plan of having medical inspectors attached to those consulates where yellow fever and cholera are endemic, with a view of securing for our protection definite information as to the exact sanitary condition, and the presence or absence of contagious diseases in such consular district. And that congress be urged to make the necessary appropriations to carry the plan into effect.

BY DR FOSTER OF GEORGIA.

Be it Resolved, That the U. S. government is hereby requested, if compatible with international and constitutional law, to enter into negotiations with Spain with a view of investing the U. S. sanitary inspectors at Spanish ports with such legal jurisdiction as may be necessary for the enforcement of such rules and requirements as are provided.

Dr. Plunkett offered a resolution that the thanks of the conference are tendered to Dr. Burgess for his able paper, and that he be requested to furnish a copy for publication.

The motion was unanimously adopted.

Dr. W. C. VanBibber read the following paper on the "Quarantine of the Future." For paper see Appendix X.

On motion, thanks were tendered Dr. Van Bibber and a copy of paper requested for publication with the proceedings of the conference.

The following resolution, introduced by Dr. Harrell, was tabled. For resolution, see XV.

Dr. Gaston, of Atlanta, read the following paper, entitled "A Plea for Yellow Fever Inoculation as a Prophylactic Measure." See Appendix XI.

Dr. Sternberg said that he had visited Rio De Janeiro and made a thorough investigation of the practice of inoculation followed there by Dr. Freire. His voluminous report was in the hands of the president. He found Dr. Freire's statistics fallacious. Of those inoculated by Dr. Freire a large number who had been exposed died and large numbers of others had the disease. Dr. Sternberg gave an explanation of the manner in which many of Dr. Freire's inoculations were made, and he had found no evidence that Dr. Freire's method of inoculation is of any practical value.

Dr. Wilkinson offered a resolution to return the thanks of the conference to Dr. Gaston for his paper, but in view of the fact that the theory of inoculation is new, that the resolutions bearing on the subject be laid on the table. Adopted.

The following letter was then read by Dr. Stern-

berg, and by motion a copy was requested for publication with the proceedings. For letter see Appendix XII.

Report of Business Committee taken up for further consideration.

TOPIC 10. When may refugees safely return to their homes?

Upon motion of Mr. Hier (Fla.) the following was adopted as the answer to Topic 10:

I. After the occurrence of ice,

After the occurrence of three (3) killing frosts,

After the occurrence of no cases of fever for the period of two (2) weeks, and after thorough disinfection and ventilation of all localities infected, and bedding and such other articles as are capable of conveying germs.

TOPIC 11. Is there any authority that yellow fever will hibernate from one year to another in the United States?

Dr. T. Grange Simons took the position that it was possible for fever to remain dormant from one year to another, and he thought that several instances had been cited to prove this.

Dr. Early of Kentucky thought that there existed in this country a spore, which in itself was harmless, but which became fructified by importation and produced yellow fever.

Dr. Wall, of Florida, gave briefly the history of the yellow fever in Tampa in 1887, and the measures taken for protection of returning refugees.

Dr. Hyer thought that the question was one for scientists and not for such a body as the conference, and after citing instances of supposed hibernation, which by many were doubted, he offered a motion that the subject be indefinitely postponed. Adopted.

Dr. Ross offered the following:

WHEREAS, Of late years almost, if not all the epidemics of yellow fever which have occurred in this country, costing many millions of dollars to the citizens thereof, besides causing the loss of many valuable lives, have been directly traceable to infection brought to its shores

from the Island of Cuba, and more especially the city of Havana; therefore be it

Resolved, That it is the sense of this conference that by proper means the disease can be stamped out of the Island of Cuba.

Second, That it is the opinion of this conference that the government of the United States should notify the Spanish government that the disease must be abated, or brought under control within a reasonable period of time; that if after the lapse of such time nothing has been done toward the abatement of this international nuisance, it is the opinion of this conference that the United States government should take control of the Island of Cuba and proceed to destroy the cause of disease at its fountain head.

Dr. Plunkett offered as a substitute, that a committee of three be appointed to report an expression of the conference on the subject.

The chair appointed Drs. Hamilton, Ross and Plunkett.

The following resolution, introduced by Dr. Hamilton, was reported by the committee as the expression of the conference :

Resolved, That this conference is of the opinion that it is a duty devolving on all nations to take measures to eradicate any plague centers from their territory, and that the existence of such plague centers is a menace to all other nations, and that our state department be requested to take measures through proper diplomatic channels for the conveyance of this opinion to the governments deemed obnoxious to the opinion as herein expressed.

Adopted.

Dr. Hamilton offered a resolution returning thanks of the conference to Dr. Jerome Cochran, State Health Officer of Alabama. Adopted.

Dr. Hamilton offered a resolution, returning thanks of the conference to president Wilkinson, for his impartial discharge of the duties of presiding officer. Adopted.

Dr. Foster offered a resolution, returning thanks to the secretary for the discharge of his duties and to the press for full reports of proceedings. Adopted.

Conference adjourned *sine die*.

The report on Quarantine Rules and Regulations is to be prepared, by the Committee appointed for that purpose, after the adjournment of the Conference.

J. L. LUDLOW, C. E.,
Acting Secretary.

RULES FOR RAILROAD QUARANTINE.

The rules of the government of railroad quarantines, as drawn up by the special committee appointed for that purpose, are here subjoined :

The committee was composed of J. C. Clark, J. B. Baird, J. R. Porter, R. S. Starkweather, Wm. Bailey, H. B. Holrbeck, J. E. Black, R. Rutherford, R. F. Gray, O. R. Early, C. M. Smith.

RULES PREPARED BY THE COMMITTEE.

1. *Quarantine should not be made against any place until it is officially known that yellow fever or other infectious or contagious disease exists at such place.*

2. *Only competent physicians should be put in charge of quarantine stations; and only thoroughly qualified persons should be employed as inspectors on railway trains.*

3. *Quarantine stations, located on railroads, should be established at convenient points, on one or both sides of a town or station, as may be deemed necessary.*

4. *If an epidemic of yellow fever or other infectious or contagious disease exist at a town or station, trains carrying passengers or freights should be required to pass through the lim-*

its of such towns or stations at a speed of not less than ten [10] miles per hour, without stopping at such towns or stations, but should stop at the quarantine station.

5. *Passengers to or from such infected point should only be received or delivered at the quarantine station, under the supervision of the quarantine officer in charge of the station.*

6. *Railway tickets may be sold to persons leaving an infected place to any point willing to receive them.*

7. *All baggage from any infected point should be properly disinfected.*

8. *As far as practicable, the same rules proposed for railroads should be applied to vessels of every kind, stage coaches, or other means of travel.*

9. *The passage of railroad trains through any point on the line of road, whether infected or not, should not be prohibited by any quarantine regulations. The conductors of passenger trains should close the windows and ventilators and lock the doors of cars passing through any place where a train is not permitted to stop.*

10. *All freight to any infected place should be delivered either at the quarantine station or the nearest railway station to such infected point, where it can be properly cared for.*

11. *All mail matter from any infected place should be properly disinfected by the United States Government. And mail matter intended for infected points should be put off the trains at the quarantine stations. The United States Government should instruct Post-Masters to receive and deliver mails at such quarantine stations.*

12. *Railroads and Express Companies, may receive for transportation from any infected place, during the time such infection exists, any merchandise or traffic consigned to places willing to receive it.*

13. *State authorities should employ competent persons on passenger trains, as inspectors of passengers, baggage and express matter, as additional precaution; but the fact of inspectors being on such trains should not relieve trains carrying pas-*

sengers, or express matter or baggage, from stopping at quarantine stations for such inspection as the officer in charge may determine to be necessary.

14. It is recommended that all quarantines, as far as practicable, should be uniform in their requirements and operations, which will greatly contribute to the prevention of panics, and tend to allay unnecessary excitement and fear on the part of the people.

15. The form of health certificate adopted by the quarantine convention, held at Montgomery March 5, 1889, should be prepared for Health Officers to issue, to such persons as may be found entitled to receive the same. A copy of this certificate should be printed with these rules, and conspicuously posted at railway stations.

16. It is the desire and intention of health authorities, as far as practicable, to throw every safe-guard around the public health of all localities. Municipal, county and state authorities are expected to co-operate in every possible way with health officers located in towns, villages and cities, and in charge of quarantine stations, to enable them to prevent the introduction or spread of yellow fever or other infectious or contagious diseases.

INTER-STATE NOTIFICATION OF INFECTIOUS AND CONTAGIOUS DISEASES.

The rules in regard to Inter-State Notification, adopted by the conference of State Boards of Health, which are referred to in these proceedings, are here subjoined for convenience of reference.

The following are the resolutions, adopted by the Inter-

national Conference of Boards of Health, at Toronto, October 6th, 1886, with slight verbal modifications.

WHEREAS, It is necessary for the protection and preservation of the public health that prompt information should be given of the existence of cholera, yellow fever or small pox ; be it *Resolved*—

1. That it is the sense of the National Conference of State Boards of Health, that it is the duty of each State and Provincial Board of Health within whose jurisdiction any of said diseases may occur, to furnish immediate information of the existence of such disease to boards of health of neighboring States and Provinces, and to local boards in such States as have no central board, in which the duty of notification shall lie upon the local boards.

2. That upon the prevalence of rumor of the existence of pestilential disease in any State or Province, if positive, definite information thereon be not obtainable from the proper health authorities, this Conference holds that the health officials of another State are justified in entering the before-mentioned State or Province for the purpose of investigating and establishing the truth or falsity of such reports.

3. That whenever practicable, the investigations undertaken under the preceding section shall be made with the co-operation of the State or local health authorities.

4. That any case which presents symptoms leading to serious suspicion of the existence of one of the aforementioned diseases, shall be treated as suspicious, and reported as provided for in cases in which the diagnosis is certain.

5. That any case respecting which reputable and experienced physicians disagree as to whether the disease is or is not pestilential, shall be reported as suspicious.

6. That any suspected case respecting which efforts are made to conceal its existence, full history, and true nature, shall be deemed suspicious and so reported.

7. That in accordance with the provisions of the foregoing resolutions, the Boards of Health of the United States and Canada, represented at this conference, do pledge themselves to an interchange of information as herein provided.

The following resolutions, explanatory of the above, were adopted by the International Conference of State Boards of Health, at Washington, September 8, 1887 :

Resolved, That the conference re-affirms the principles contained in the resolutions adopted by it at its meeting in Toronto in 1886,

2. That the communicable diseases hereinafter mentioned, prevalent in certain areas, or which tend to spread along certain lines of travel, be reported to all State and Provincial Boards within said area or along said line of communication.

3. That in the instance of small-pox, cholera, yellow fever and typhoid fever, reports be at once forwarded, either by mail or telegraph, as the urgency of the case may demand ; and further, that in the instance of diphtheria, scarlatina, typhoid fever, anthrax or glanders, weekly reports, when possible, be supplied, in which shall be indicated, as far as known, the places implicated, and the degree of prevalence.

APPENDIX.

PAPERS READ BEFORE THE

MONTGOMERY

QUARANTINE CONFERENCE,

MARCH, 1889.

APPENDIX I.

PROPOSITIONS TO BE SUBMITTED TO THE QUARANTINE CONFERENCE.

PROPOSITIONS SUBMITTED BY DR. A. N. BELL, OF NEW YORK.

Every organized government, State or local, has the right of protecting itself against the introduction of infectious or contagious diseases, and, to this end, of excluding any person or thing and of prohibiting communication by or with any country or place deemed likely to introduce infectious or contagious diseases of any kind ; *Provided however*, that no prohibitory measures should go so far as to exclude or drive from port any infected vessel ; or refuse proper care and treatment of any persons who are afflicted with or who have been exposed to an infectious disease, no matter what may be its nature.

With special reference to yellow fever :

A filthy vessel from any place where yellow fever is wont to prevail, or that is in habitual communication with any such place, is much more to be dreaded as a vehicle of introducing the disease than any person or thing such vessel may have on board. No such vessel, whether there has been recent sickness on board or not, and no matter what the condition of the last port of departure of any such vessel, or her bill of health, should, in the summer time especially, be allowed admission to any city wharf, or to lie

alongside any other ship or vessel, until broken out and thoroughly cleansed, and all the cargo, merchandise, effects, ballast—*material* and *personnel*—of such vessels are more or less dangerous and should be treated accordingly.

All vessels should be visited as soon as practicable after their arrival, always within twelve hours at the outside, and subjected to examination and questioning by the sanitary authority of the port. The history of the vessel should be particularly inquired into with reference to the ports she has visited, sickness on board and measures to which she has been subjected, if any, for cleansing; and the result of such examination should be recorded upon a special register kept for the purpose.

All persons found on board a vessel infected with yellow fever who have not had and fully recovered from the disease should be removed therefrom to places of healthful surroundings as soon as possible. The detention of the sick in infected vessels greatly adds to the danger of a fatal issue; and every hour's detention of the well in any infected vessel or place adds to the danger of contracting the disease.

Persons who have been exposed to yellow fever infection within five days of the time of their arrival at any place with an average temperature of 70° F. or upward, should be secluded in a healthful place, and required to divest themselves completely of all clothing that has been worn on board or exposed to the atmosphere of an infected ship, or to that of any place where yellow fever existed at the time, to thoroughly wash themselves and substitute clothing which has not been so exposed, before admission to intercourse with the inhabitants of the place, or permission to proceed elsewhere. These requirements being fulfilled, and they should always be as soon as possible after arrival, there is no danger of such persons propagating the disease, and they should be permitted liberty.

Personal effects, merchandise and ballast which have been exposed to an infected ship or brought from an infected

place, are more or less dangerous, according to the nature of the substance. Such substances may be enumerated, approximately, in the order of their greater liability to propagate infection, as follows :

Personal clothing, bedding, rags, paper rags, books and papers, hides, skins, feathers, woolens, hair, and all other remains of animals, porous ballast, silks, cotton, linen, hard ballast.

PROPOSITIONS SUBMITTED BY DR. JNO. B. HAMILTON, SURGEON
GENERAL MARINE HOSPITAL SERVICE.

TOPIC 1.—What form of notification shall be adopted in case of occurrence of yellow fever? To whom shall the first notification be sent?

TOPIC 2.—On receiving notice of existence of yellow fever in any place, is it desirable that the Government should send an inspector, free from local influences, to verify?

TOPIC 3. Under what circumstances should an epidemic be declared to exist?

TOPIC 4.—How soon should we advise depopulation in the event of the appearance of yellow fever in any place?

TOPIC 5.—Is it practicable to cause depopulation of large cities? Is it necessary to secure additional legislation to compel persons to sojourn in camps of refuge?

TOPIC 6.—Are probation camps desirable? By whom should they be managed and supported? What period of time should elapse from the time of arrival at camp until the granting of free pratique? Should probation camps have separate yellow fever camps? Should the certificate of the officer in charge of the probation camp entitle a person to enter free any other place?

TOPIC 7.—Is it desirable to allow special trains to pass to mountainous regions, comparatively uninhabited?

TOPIC 8.—On the occurrence of a case of yellow fever, what immediate measures of isolation are desirable? What restriction should be placed on physicians in attendance

on a case of yellow fever? In case of death, what disposition should be made of the body?

TOPIC 9.—What means of disinfection should be adopted for chambers and dwellings where cases of yellow fever have occurred?

TOPIC 10.—What system of disinfection should be adopted for the disinfection of personal baggage of persons fleeing from an infected place?

TOPIC 11.—Is yellow fever contagious? What diagnostic signs should be agreed upon as reasonable proof of the presence of yellow fever? What post-mortem evidences should be accepted as conclusive that the person died of yellow fever?

PROPOSITIONS SUBMITTED BY DR. J. N. MCCORMACK, SECRETARY
OF THE KENTUCKY STATE BOARD OF HEALTH.

Resolved: (1) That it is the sense of this Convention that all ports on the Gulf coast, and all on the Atlantic coast south of, and including Charleston, not fully equipped for quarantine administration, in accordance with the most approved modern methods, should be closed against vessels from West Indian and South American ports from the first of March to the first of October in each year.

Resolved: (2) That this Convention urges upon all health authorities of States represented in it the importance of strict compliance with the agreement of inter-State notification adopted by the National Conference of State Boards of Health, and the Sanitary Council of the Mississippi Valley, in regard to all communicable diseases, and especially in regard to yellow fever.

Resolved: (3) That upon the outbreak of yellow fever in any city or town, this convention urges such co-operation in quarantine administration on the part of threatened States as will confine the disease to the point of initial attack, in place of the expensive, unscientific and unsatisfactory so-called quarantines at distant State lines.

Resolved: (4) That this convention urges upon the health

authorities of each State the importance of such an administration of any quarantine they may establish as will furnish proper protection to, and show due regard for the rights of States lying beyond them.

PROPOSITIONS IN REGARD TO THE QUARANTINE OF RAILROADS, SUBMITTED BY DR. JEROME COCHRAN, STATE HEALTH OFFICER OF ALABAMA.

(1.) During the prevalence of yellow fever epidemics, passengers and freights should be brought from infected localities only under such regulations and restrictions as may be established by the health authorities along the lines of the roads concerned.

(2.) The regulations and restrictions governing railroad transportation during yellow fever epidemics should be of such character as to afford all reasonable guarantees of protection to the communities in danger of invasion by the disease, but should not be more onerous than the circumstances warrant, and should be framed with due consideration of the extent and character of the danger in each particular case, and as affected by latitude and seasons of the year, and other qualifying conditions.

(3.) At all seasons of the year, and under all circumstances, the simple passage of railroad trains should be allowed, without obstruction, even when carrying sick refugees from infected places, to healthy localities willing to receive them.

(4.) When the transfer of passengers or freights from infected localities from one railroad to another becomes necessary, such transfers should be done under such precautions as may be deemed necessary by the health authorities of the places at which the transfers are made; but no restrictions should be made that will render such transfers impracticable, and transfers of passengers and freights from places not infected should not be burdened with unnecessary restrictions. Quarantines against all the world are illegal, mischievous, and in every way unwarrantable.

(5.) Quarantine inspectors on rail road trains should be under the control of the health authorities of the several

States, rather than under the control of the health authorities of the communities scattered along the line of the road. In this way quarantine regulations may be enforced with the smallest amount of friction and inconvenience to the travelling public and with the maximum of efficiency and economy. At the same time the wishes of the local authorities should be treated with all due consideration.

(6. When circumstances require it the States should establish quarantine camps at such places as may be most convenient for the detention of travellers, disinfection of baggage, and treatment of the sick. It is barbarous and inhuman to dump off travellers of any sort, and especially women and children and the sick, on the side of the road to take care of themselves the best they can. .

PROPOSITIONS IN REGARD TO THE LOCAL MANAGEMENT OF YELLOW FEVER—SUBMITTED BY DR. JEROME COCHRAN, STATE HEALTH OFFICER OF ALABAMA.

(1.) When one case or a few cases of yellow fever occur in any community, it does not follow of necessity that the disease must spread and become epidemic. On the contrary, the experience of many countries through long periods of time shows conclusively that in the majority of such instances and without the observance of any special means of prophylaxis, the disease fails to spread.

(2.) When one case or a few cases of yellow fever occur in any community, in the light of our present knowledge of the habits and modes of propagation of the disease, it is generally possible, by the employment of the proper prophylactic measures to prevent the development of an epidemic.

NON-INTERCOURSE.

(3.) The golden rule for the prevention of the spread of yellow fever is non-intercourse—isolation—the keeping of the well away from the sick, away from infected things, and very specially away from infected localities.

(4.) In the enforcement of this golden rule of non-inter-

course two problems present themselves for solution. (a) To keep the people generally from coming into the infected houses and the infected localities ; and (b) To keep doctors and nurses and other attendants and the well members of sick families from visiting and mingling with people outside of the infected houses and localities. The solution of the first of these problems is comparatively easy. The solution of the second is sufficiently difficult. But it is possible to solve them both.

(5.) In the densely settled sections of cities guards may be useful for the enforcement of non-intercourse. They are much less needed in sparsely settled towns. In villages and country neighborhoods, as a rule, they are not needed at all. In all cases every intelligent family should be able to take care of itself—should be able to keep all of its members away from infected houses and localities, and to guard its own premises from invasion by dangerous persons and things.

(6.) Non-intercourse may be practiced in the very centre of an infected district with considerable probability of escaping the fever. Cloistered convents and prisons in infected cities, with yellow fever raging all around them, usually escape invasion ; and there are numerous instances on record in which private families in the midst of epidemics have passed the ordeal safely by the vigorous enforcement of non-intercourse.

DISINFECTION.

(7.) Disinfection in yellow fever is based very largely on theoretical grounds. Nevertheless, we believe that it may be made a valuable agent in checking the spread of the disease. In the beginning of an outbreak all the resources of disinfection should be exhausted, and these efforts should be continued until the epidemic is fully established. After the epidemic has subsided disinfection is of very questionable value.

(8.) The disinfecting agents most to be trusted are heat,

especially moist heat, cold, both artificial and natural, and especially cold weather and frost; and certain chemicals, especially the bichloride of mercury and the fumes of burning sulphur. To these must be added ventilation.

(9.) The disinfection of beds, bedding, clothing, and articles of similar character is comparatively easy. The disinfection of single rooms, and perhaps, also, of single houses, is more difficult but not entirely impracticable. The disinfection of yards must be regarded as very difficult, but in the beginning of an outbreak it should be attempted. The disinfection of a whole city, or even of a large section of a city, seems not to be practicable.

DEPOPULATION.

(10) In the beginning of an outbreak of yellow fever there is no need of depopulation at all, except of infected houses, or infected districts; but if people who are able to afford the expense desire to leave they should do so quietly and deliberately, and no obstacles should be placed in their way; and those who leave healthy districts of the city or town should go wherever they please, without let or hindrance.

(11) Persons living in infected houses, or in infected districts, should be encouraged to leave, but should be allowed to leave only under such restrictions as will afford reasonable guarantees of safety to the communities in which they find asylum; and they should be sent only to such communities as are willing to receive them.

(12) In the depopulation of infected houses, or of special infected districts, the inhabitants should be removed into camps of probation, or into vacant houses in the adjacent country. After five days detention, if they remain well, and under proper regulations, such as disinfection of baggage, they should be considered free from danger, and allowed to go freely into any community willing to receive them.

(13) The depopulation of large cities is altogether impracticable. The depopulation of sparsely settled towns and villages is altogether unnecessary, as in them it is always possible to prevent any general spread of the fever.

(14) Refuge camps, that is to say, camps for the continued residence of people during the prevalence of epidemics, have heretofore been of small value. One reason for this is that it is never possible to induce any considerable proportion of the population of an infected city to take refuge in the camps. Camps of probation, for temporary detention, may often be very useful.

(15) Panics and stampedes are always without excuse and at the same time excessively mischievous. At the beginning yellow fever always spreads slowly; and there is always time for every body who desires to leave an infected place to do so without hurry and under proper regulations.

SHOT GUN QUARANTINES.

(16) Shot gun quarantines are barbarous, and discreditable to our civilization. All quarantines should be under the control of experts.

HEALTH CERTIFICATES.

(17) Health certificates should be required only in the case of persons leaving an infected place. They should be issued only by the health official in charge of the infected place. In each certificate the person to whom it is issued should be so described as to admit of his identification, and should state the facts of the case fully and circumstantially. And to such certificates full credence should be given by all health authorities. We must have honesty and mutual confidence amongst those charged with the protection of the public health.

PLACES OF REFUGE.

(18) Under proper regulations refugees from infected places may be allowed to go anywhere without danger of carrying infection with them, and should generally be allowed to do so. Still, it is better that they should go to cooler and more northerly climates, and into states and cities not ordinarily subject to yellow fever. In regard to this matter, a great deal depends

on the season of the year. In June or July precautions may be wise that would be entirely unnecessary in September or October.

WHEN REFUGEES MAY RETURN.

(19) In most of our southern communities refugees from an infected place may return safely after the appearance of a killing frost. In the present state of our knowledge it is not possible to say whether or not frost kills the yellow fever poison, but the experience of many hundreds of epidemics shows beyond all controversy that it puts an end to the prevalence of the fever.

(20) Even in places where no frost is ever known, experience teaches that after the subsidence of the fever for a reasonable time, there is no longer any danger. When the fever disappears the danger of contracting the fever disappears also.

HIbernation.

(21) In the extreme southern parts of our country, and in very mild winters, it is possible for yellow fever to live through the winter months and to become epidemic again on the advent of the following summer. But in all such instances it is kept alive by the occasional occurrence of scattered cases—cases springing up here and there at intervals of only a few weeks. It does not hibernate in any other way than this. It never goes to sleep when the cold weather comes in the autumn, to sleep for three, four or six months, and to be awakened into malignant life when the hot weather comes the next summer.

FINANCIAL MANAGEMENT.

(22) In yellow fever epidemics, as under other circumstances, all self-respecting persons and all self-respecting communities should pay their own expenses, and take care of themselves just as long as they are able to do so, and the aid of public charity should be invoked only in cases of real necessity.

(23) In yellow fever epidemics physicians should make their regular charges, just as in the treatment of other diseases, against all persons who are able to pay; and neither physicians, nor medicines, nor nurses, nor provisions, nor assistance of any kind should be furnished at the public expense to any persons except those who are really in indigent circumstances. To help those who are able to help themselves is an abuse of public charity.

(24) The administration of the quarantine laws should always be under the direction of the legally constituted health authorities of the community to be protected. The health authorities may make mistakes, but they will make fewer mistakes than the political authorities will make. As quarantines are at present conducted in many of the states, the aggregate of quarantine expenses is much greater than there is any necessity for.

(25) The quarantine of small towns is a very simple problem, and may be managed without much expense. As the population increases the problem becomes more and more difficult; and in very large cities it requires for its wise solution the highest expert skill, and abundant means.

(26) There are two sorts of quarantine fundamentally distinct—the police quarantine and the scientific quarantine. The purpose of the police quarantine is to exclude everything coming from the infected locality. The purpose of the scientific quarantine is to exclude only such things as are dangerous. Very often, especially for the protection of small communities, the police quarantine is the only one that is available. But as far as circumstances will admit of it, the scientific quarantine under the management of quarantine experts, should always be preferred.

(27) Local quarantines, that is to say the separate quarantine of towns and counties should, as far as circumstances will warrant, be superseded by state quarantines, and this on the grounds alike of economy, efficiency and convenience..

APPENDIX II.

MARITIME QUARANTINE SERVICES OF THE SOUTHERN SEA PORTS.

The quarantine systems of the Southern Atlantic and Mexican Gulf Ports of the United States is a matter of paramount interest to the members of this conference; the health, prosperity and happiness of our people being intimately connected with the management of preventive measures against the introduction of contagious disease.

The means of rapid communication between points in our country, the extensive trade enjoyed by the different cities with each other, the constant arrival of travellers, on business or pleasure bent, from one place to another, wipe out the imaginary geographical lines and unite the vast field into one common whole; the people possessed with kindred interests, sharing mutual joys, and facing mutual dangers, even though a local disaster may threaten not the well being of other neighboring communities, it never fails to excite the warmest sympathy; and generous and substantial aid is never wanting to the unfortunate. When at any time, however, the calamity befalling one involves and threatens devastation to other points, the means by which such evil has happened, becomes the subject of proper community inquiry, and measures for prevention of the repetition of such peril are made the one common care of all. Indeed, from a property standpoint the commercial damage inflicted by the appearance of yellow fever at one place in the South cannot be limited to that point. Commercial apprehension of the spread of the disease to other towns must necessarily follow, and the commercial credit of the whole country is to that extent impaired, and so one common danger—one

common interest cannot fail to make of us co-workers in one common cause.

The history of yellow fever epidemics of this country reveals the fact that the largest number prevailed at the time of greatest and most unrestricted tropical traffic. At one time the disease appeared annually at every sea port, from Portland, Maine to New Orleans, the extent and malignancy of the scourge varying in different years. On the cessation of this traffic, by compulsion under the edicts of parliament in 1762, until the close of the Revolutionary War, the occurrence of yellow fever ceased at those ports affected by the edicts, to reappear on the resumption of trade, to disappear again on cessation of foreign trade under acts of Congress 1809 to 1811, and the war of 1812 to 1815, and to reappear again when trade was again revived. Quarantine restrictions were very soon thereafter imposed at the larger ports which had absorbed the foreign business of neighboring smaller ones, with varying but progressive successes until the usefulness of that institution has long been fully demonstrated. Difference in quarantine rules necessary for safety have not heretofore been caused by geographical and climatic conditions alone. Selfish interests largely dominated; commercial influences shaped the measures of restriction; personal gain to a great degree controlled the actions of many men, and that form of quarantine least in cost—least in obstruction to the individual was strenuously advocated as the best by those pecuniarily interested. The history of quarantine at New Orleans illustrates this aptly. The city being at one time purely commercial, that which would interfere with its Marine was forcibly resisted—the inhabitants engaged in a fierce party war—the importationists were overcome by those holding the doctrine of local origin, and thus exemption from the disease, at this port, was delayed for years.

The quarantine systems of our country may be briefly classed into two divisions:

First:—Those imposing prohibition of tropical trade during the warm months of the year, and—

Second:—Those providing some form of disinfecting appliances, conjoining with the operation of these detentions in quarantine of all vessels arriving at their ports engaged in such tropical trade. The first secure protection at the cost of a certain portion of commerce, and the second, when sufficient, secure protection with but slight maritime embarrassment. If not sufficient, safety is not obtained and all commerce soon becomes lost.

Public inquiry into the manner of administration of the various quarantine services at the sea ports of our country has never been seriously undertaken, prior to this date, except in two instances—one in the methods in use at New Orleans subsequent to the yellow fever epidemic in 1878; and the other, those of New York on the arrival at that port two years ago, of the cholera infected ship *Alesia*. That the recent epidemic in Florida has given a new impetus to every properly interested person to make necessary investigation into the subject is apparent, and the permanent organization of a qualified board of inquiry, depending for its authority upon community of interests, and the unwritten law of public opinion, is now a foregone conclusion, should the necessity not be provided for by national legislation. The measures of disinfection adopted at all of the quarantine stations in the United States except that of New Orleans, and in a minor degree that of New York, consist in fumigation of vessel and effects with sulphur dioxide; use of solutions of copperas, carbolic acid or mercuric chloride over the ballast and in the bilges, and in some instances whitewashing the interior of ships with calcium oxide, an additional measure of safety—detention in quarantine more or less short or long being imposed.

At New York chloride has occasionally been substituted for sulphur dioxide, and, by help of a little machine, baled rags are heated two or three inches from the channel of entrance of a pipe discharging super-heated steam.

The value of methods of disinfection may be obtained by collaborating the experiments of chemists and those of practical every day use. Of the former the comprehensive report of the committee on disinfectants made to the American Public Health Association at its meeting held in Memphis in 1886, is most instructive. Of the latter the individual experience of disinfecting officers is of considerable practical weight.

The committee referred to assigned a low place to sulphur dioxide as a germicidal agent in non-spore bearing micro-organisms, denied it a position for those bearing spores, and recommended its use in so much larger percentages, and for so much longer time than had been customary, as to lead to candid conviction that rarely had any beneficial effect ever been obtained by its use at any quarantine station. Disinfection of premises where had occurred cases of contagious disease, sulphur dioxide fumigation forming part of the process, from the reports of sanitary officers from various sections of the country appears to be of great value, but the individual part played by fumes of sulphur in the good work has not as yet been accurately assigned. The experience acquired by the officers of the New Orleans quarantine service, after use of the agent in a manner as thorough as usually obtained at other places, shows repeatedly that cases of yellow fever appeared on vessels which had been subjected to its employment. Other places present like testimony as to the sometimes inefficacy of this germicide. In a series of experiments conducted by Assistant Surgeon J. J. Kingyoun, at the New Orleans quarantine station—to which duty he was kindly detailed by Surgeon-General Hamilton—he demonstrated that in the customary fumigation of vessels, although the percentage of gas obtained there by means of furnace and steam fan was greater than that from the old custom of burning in iron pots, no considerable number of classes of micro-organisms were killed. His experiments were not conducted with intent to ascertain the requisite percentage

of gas, and time of exposure necessary to destroy a particular class, but to determine the actual value of usual every day fumigation of vessels. The result revealed that sulphur fumigation alone usually practiced at any and all quarantine stations is most probably of very little.

After prolonged fumigation of rooms with dense fumes of sulphur, it is usual to notice a large number of dead insects, but close observation will show a certain proportion of live ones. The fumigation of baggage at the Waycross station during the past summer was certainly as thorough as that practiced at any quarantine station, and yet in a letter to me from a gentleman at that place, he states it did not kill body lice. Not any number of negative facts that yellow fever has not appeared on vessels from infected regions subsequent to fumigation by sulphur will destroy the potency of one positive fact that it has so appeared, and of the latter there are many instances on record. Practical experience, therefore, warrants the belief that the special cause or poison of yellow fever is not always destroyed by exposure to sulphur dioxide in the manner hitherto practiced.

The relative utility of mercuric chloride, carbolic acid, chlorine, and lime is so clearly and ably set forth in the report of the committee above mentioned that I will refer my listeners to the pages of the proceedings of American Public Association for 1886.

The time of detention in quarantine is a matter of considerable consideration, an unnecessary detention is a matter of cost and inconvenience to vessels, and to that extent is an embarrassment to commerce. At most of the quarantines the time varies from ten to forty days. The value of this portion of the quarantine service is sufficient or insufficient whether after or before disinfection of vessels. Referring only to the immediate past, a vessel from Havana lay twenty-one days at the Pensacola quarantine, at the expiration of that time went on to the wharves of the city; among the men who began loading her yellow fever appeared, and an epidemic followed. A vessel forty-two days on the voyage from Rio Janeiro lay an ad-

ditional ten days at the New Orleans quarantine, three days after leaving, making a total detention, one may say, of fifty-five days, two of the crew were attacked with the disease. Each of these vessels presented absolutely clean health records. Will a detention of ten days be sufficient in a case similar to the one at Pensacola, or will one of forty days guard against danger from one like that at New Orleans? After three successive seasons of sufficient disinfection of vessels at New Orleans the period of detention has never exceeded five days thereafter, and I have every reason to believe that this may be safely reduced to three, but invariably dating the hour of commencing detention from the time of completed disinfection.

Lengthy voyages and long periods of detention in quarantine remove no source of danger, but on the contrary are full of peril to an over confident community. The form of quarantine service compatible with safety to those parts which do not possess sufficient tropical trade to justify expensive and properly equipped sanitary apparatus may be inexpensively obtained, if operated in conjunction with those quarantine stations now and about to be established by the National Government. Let these be considered as stations for the treatment of vessels then and recently infected, and the local stations for the cleansing and observation of vessels with clean health record from suspected or infected ports. Not every vessel from contaminated ports is dangerous, but the possibility of positively determining its true character exists in nearly every instance. Observation of the records of vessels manifesting infection at the port of entrance, after having been free from disease during the voyage and at the port of departure, will invariably show that such manifestation has occurred among the laborers who first went on board and engaged in shifting ballast and cleaning holds, or among the sailors who got out from the depths of their bags and boxes articles which had been packed away while in an infected atmosphere and not since disturbed. Infection, whether conveyed thousands of miles by sea, during hundreds of days, at the bottom of a

sailor's bag, is as highly dangerous as that brought in a closed carpet sack, in as many hours, on a railroad car by land. Unpacking of all goods, shifting of ballast, cleaning up holds and all nooks and corners, pumping out bilge water, removal of boards along each side of the keelson, the accumulated filth taken out, and all of that work necessary to put a vessel in a perfectly cleanly and well ventilated condition being done, will, in the vast majority of instances, cause any existing lurking infection to declare itself in the illness of some of those engaged in such labor. Usually this work is done at the wharves of the port of entrance, and usually at this time the seeds of a devastating disease are sown amongst the inhabitants.

The question may be asked whether this work had not best be done by acclimated men. The fact that at few ports can acclimated men be found is the answer. If possible, to make assurance doubly sure, disinfection of everything on board should be practiced. By means of a pump worked by two men, and sufficient leads of hose, solutions of chemical disinfectants can be thrown to all parts of the vessel. Should sulphur fumigation be decided upon all textile fabrics should be carried into the holds and hung loosely and separately upon ropes stretched across. Either the liquified anhydrous sulphur dioxide confined in iron flasks and liberated by means of screw cocks, or a simple inexpensive reverberating furnace, loaded with three pounds of sulphur to every thousand cubic feet of space to be disinfected should be fired and lowered into the holds, the hatches and all other openings tightly closed, and the fumigation proceeded with for at least twelve consecutive hours. Thorough ventilation of every part of the vessel should have been obtained by wind-sails or other means, and a certain amount of moisture left in the holds for greater efficiency of sulphur fumigation. If at the expiration of the five days after such cleaning and disinfection, no case of yellow fever appears amongst the crew of a vessel so managed and treated she may be safely considered harmless to any community. Liquified anhydrous sulphur dioxide will probably very soon take the

place of the gas obtained by burning sulphur in furnaces. This article, liquified under pressure, is manufactured in this country, but the cost here is about \$65.00 per hundred pounds. At the works of a zinc factory near Oberhausser, Germany, the gas will be placed on cars in suitable, safe, and conveniently handled flasks, or retorts, for \$4.00 per hundred, or about the cost of that weight of rolled sulphur itself. As it is easily transferred from a large to smaller receptacles, and the cost in bulk is much less than in package,* considerable economy may be practiced by importing in large retorts. It volatilizes to about 2700 times its original bulk after being liberated, and this property adapts it particularly for use on vessels with cargo. Certainty in percentage to contained atmosphere is another recommendation. An experiment will most probably be made with it the coming summer, and if so, and permission can be obtained from Surgeon-General Hamilton, the result will be published in the Weekly Abstracts of Reports of the Marine Hospital Service. The treatment necessary for actually infected vessels will require an apparatus more costly than the limited tropical commerce of many of our ports would justify. Through the liberality of the General Government some stations of this character are already established and others soon will be, and to these stations should be sent all infected vessels which arrive at ports whose quarantine service is not properly equipped for the treatment necessary. Of all the quarantine systems which treat actually infected vessels, that at New Orleans is most assuredly the best. The institution of the system is due to the intelligence and untiring labor of Joseph Holt, M. D., who, after much opposition, and much unfavorable criticism, succeeded in establishing methods ensuring, when properly administered, entire safety from danger of yellow fever, at the same time disembarassing trade of hurtful restrictions. The success which this man achieved, disenthraling New Orleans from the annual sway of yellow fever and permitting opportunities for the indefinite extension of her commerce and manufactures, entitles him to the admiration and gratitude of his fellow men, and to a dis-

tinguished place in the foremost rank of philanthropic sanitarians. Descriptions of this system have been so often, and so widely published, that full particulars are now unnecessary.

The experiments conducted by Assistant Kinyoun at this station last April showed, however, that pre-eminent as its success had been, in protecting the country from the introduction beyond its limits of even one case of yellow fever, certain improvements to reach scientifically positive germicidal effect in all classes of known pathogenic micro-organisms were necessary. In order to reach this result the board of health of Louisiana decided upon the erection of cylindrical heating chambers, 8 feet in diameter and 50 feet long, built of steel, and capable of safely bearing 15 lbs. working pressure to the square inch. These chambers are provided with tightly fitting heads, steam coils and jets, guages, thermometers, blowoffs, suspended rail tracks, and racks on which to hang all textile fabrics. Although not as yet completed, the contractors guarantee 250 degrees dry or moist heat, can be attained in them within 30 minutes. The application of a lower temperature than this, 230 to 212 degrees under pressure, ensuring uniformity of temperature throughout the matter to be disinfected, will fulfill the highest expectancy of success, and every requirement of the best practicable disinfectant recommended by that high authority, the committee on disinfectants of the American Public Health Association. By way of parenthesis I will state that this form of apparatus, mounted on platform cars, was urgently recommended to the Surgeon General of the Marine Hospital Service early last summer for use at the outlets from Florida. I have assurances that if the national government does not adopt this or some other good process for inland use, such will be built by private subscription, and placed in the hands of local authorities at points of egress, from any place which may in the future become infected. With the addition of elevated tanks from which solution of mercuric chloride may be thrown over every portion of the interior of vessels, steam fans for

changing atmosphere of holds and replacing it by one charged with sulphur dioxide, hoisting engines for the discharge of ballast, hospitals some distance removed for the care of the sick, the New Orleans quarantine station is equipped to satisfy every demand of science, of commerce, and of humanity, and the practical experience of three successive seasons demonstrates its sufficiency to effectually deal with that poison which has eluded the grasp of the pathologist and the vision of the microscopist, the yellow fever germ.

The treatment absolutely necessary for actually infected vessels must approach very closely to that in vogue in Louisiana, or public apprehension of the danger from vessels otherwise infected cannot be allayed until long years of successful work under those different methods practically demonstrate their sufficiency.

APPENDIX III.

QUARANTINE REGULATIONS.

BY COL. J. C. CLARK, VICE-PRESIDENT MOBILE & OHIO RAILROAD.

To the Chairman of Quarantine Convention, Montgomery, Ala.

SIR:—My experience in operating railroads, under quarantine regulations, leads me to suggest :

1. There should be uniform rules adopted for the management of quarantines, as far as practical, which regulations should name what articles of merchandise, &c., &c., if any, should be permitted to be transported by railroads, to, from or through infected points, during the prevalence of yellow fever or other infectious or contagious diseases, to enable railroads to co-operate with boards of health, in refusing to receive for transportation, such articles as are prohibited.

2. A well digested quarantine formula, making and promulgating the necessary rules and regulations for enforcing the same, should be prepared, ready to be put in force when necessary to do so, at all points where it is necessary to put quarantine in force. These rules should be published for public information, to enable all persons to comply with the same, and displayed by placard in every depot.

3. At quarantine stations, accommodations should be provided for caring for such persons, if any, that may be detained, or are not permitted to pass through such stations, while in transit until they can be disposed of.

4. Only first-class, reputable physicians, who have had experience with contagious and infectious diseases, should be made inspectors at quarantine stations upon railroad

trains, travelling to and from designated points, whose duty shall be to inspect and examine the condition of passengers, baggage and express matter. Such inspectors should have the power to administer oaths, and to remove from the trains, or detain such passengers, baggage or express matter, &c., as may be found necessary to prevent the introduction or spread of infectious or contagious diseases of any kind.

5. State boards of health should be the powers authorized to put quarantine in force. They should determine when, where and for what length of time quarantines should be maintained; provide the means necessary for enforcing the same, and promulgate rules and regulations for conducting quarantines.

Presidents and secretaries of state boards should be required to visit and inspect all quarantine stations, as often as practicable, during the existence of such quarantines; and to make public, over their signatures and official positions, the general condition of the public health at the points where quarantines are established, and the localities affected by such quarantines. Local health officers, municipal or county authorities, may establish quarantine regulations, conferring with the state board, if deemed necessary, for co-operation. The regulations for governing local quarantines should not be in conflict with the rules and regulations adopted by the state boards of health for enforcing quarantine regulations.

6. The national government should take charge of and maintain a rigid maritime quarantine, and locate such quarantine stations at such points on the sea-coast and on navigable rivers, at proper points, so as to prevent the introduction of yellow fever or any other contagious or infectious disease into any state or territory of the United States, leaving to the state authorities, the power to deal with these matters in the states, outside of maritime quarantine. It should be the duty of the general government to provide and conduct such mar-

itime quarantines, so as to prevent the introduction of yellow fever, or any other infectious or contagious diseases from being communicated to the inhabitants or people of any state or territory of the United States.

If this were done, and earnest co-operation secured, there would be no conflict or friction detrimental to the general public health, between state and United States authorities; but a hearty, earnest effort to secure the purpose intended—the preservation of general public health.

7. When any suspicious case occurs, the nature of which has not or cannot be determined at its then present stage, or doubts arise as to the nature of the case, wise precaution demands that such case be immediately isolated from contact with all other persons until medical science has diagnosed the case, and is able to determine the nature of it, beyond doubt. When conclusions are reached, they should be made public. Such a course would allay the fears of the people generally.

8. Experience has proven that by proper precautions and constant vigilance on the part of well organized Boards of Health, yellow fever and other contagious and infectious diseases, can be kept out of the country, without resorting to the doctrine of absolute non-intercourse, or paralyzing commerce and industrial pursuits, or interdicting travel within or beyond the limits of state lines.

9. The legislatures of the different States should appropriate such sums of money, as a fund for protecting the public health in the states, as would be sufficient to meet all necessary expense incurred for this purpose, under a well digested law, throwing proper safe-guards around such appropriations, so as to insure economy and responsibility. In dealing with the subject of the general public health, this is a matter that admits of no pinching policy, and the appropriations should be large enough to fully provide the necessary safe-guards, and thus meet the purpose intended, the preservation of the general public health. With proper officers conducting this matter, no more money would be expended than is absolutely necessary.

APPENDIX IV.

THE EPIDEMIC OF YELLOW FEVER AT GAINESVILLE, FLORIDA, AND DEDUCTIONS THEREFROM; BY MR. JOSEPH VOYLE, C. E.

Before we can intelligently devise any method of quarantine, it is necessary that we understand something of the nature and habits of that which is to be quarantined against, so as to bring into accord, as near as possible, the greatest degree of public safety, and the least degree of public embarrassment.

When first entering upon the work of writing a history of the epidemic of yellow fever at Gainesville, Florida, it was intended to give in detail every incident that came to my notice. This being altogether too voluminous for reading here, and having much that, whilst of general interest, is not directly related to the subject before us, I have selected such portions as appeared to me to be worthy of consideration, in devising methods of prevention, or avoidance of yellow fever.

I have for many years past made careful study of every item of information that I could obtain on this subject; much has been written thereon, but so entirely has this writing been confined to medical men, that I feel as if I was intruding, by offering the results of my studies on this subject.

But the doctor in his noble work of relief at the bedside of the individual, and the civil engineer in his work of controlling the insanitary conditions of the community, are both in a position to study the course of an epidemic,

although from different standpoints. If it be made a matter of mutual interest, they can together do far more than either alone.

Having enjoyed the intimate friendship of doctors eminent in their profession, and experienced in yellow fever; reading whatever I could find written; personally observing, when practicable, I have necessarily obtained some practical information on the subject before us; and this I have tried to classify, arrange and, as it were, to crystalize into a few short sentences as deductions therefrom; and as they are from a far wider field than the locality of my short history, I give them first; then, as incidents are related, the mind will readily recall and compare.

My deductions are—

That the cause is specific and foreign to our climate.

It is practically, to the general public, invisible and intangible.

Its transportation and multiplication is almost altogether confined to human beings, and to fluid or moist matter.

It is strictly non-contagious.

It is infectious; the infection is confined to certain limited conditions.

It is not always epidemic.

Epidemics occur only under certain conditions.

Epidemic conditions are cosmic, atmospheric, terrestrial, and require the presence of the specific cause.

The cosmic conditions are periodically recurrent, and always beyond human control, but they are partially calculable.

The atmospheric conditions result from the cosmic and terrestrial, either or both; the cosmic may be absent, the terrestrial is always necessarily present.

The cosmic intensifies and extends.

Cosmic conditions are general, over a large area.

All necessary conditions except the specific cause, may exist; the conditions cannot, without the specific cause, produce yellow fever.

Atmospheric and terrestrial conditions are confined to limited areas, and are intimately associated with each other.

Meteorologic, as a part of atmospheric conditions, cause variation in terrestrial conditions.

Terrestrial conditions are sometimes very small in area; recognizable and hence avoidable.

From observation, I give this hypothesis concerning the specific cause:

That it is a distinct entity.

That it has three periods in its life history.

That these are: the destructive, the transformative, and the infective.

That it is transferable in either form, but, under dissimilar conditions.

That when finding a lodgment in the human body, it incubates, and takes the destructive form; and may thus be carried from place to place.

That it is ejected from the body when its destructive life is complete, and that when it leaves the body it is neither contagious or infectious.

That if, when ejected, it finds suitable conditions, it transforms to the second stage.

That in the second stage it is germinative and multiplying, producing the third stage; in which it is aerial, or aeriform, and infective.

That finding suitable conditions, the second form may permanently remain and produce the infectious form.

That the conditions for transformation are wet or moist dead vegetable matter, and a suitable temperature.

That the infectious form will travel to a considerable distance in a moist atmosphere at a suitable temperature.

That the specific cause in all forms is rendered permanently inactive by low temperature and absence of moisture.

That careful cleanliness without destruction of fœcal matter, is no protection against yellow fever.

I am aware that, unsupported by well established facts, these sentences have little or no value for guidance in the

field of action. I come from the field of action, where all other occupations being suspended, there was opportunity for observation, and, with a desire to search out the truth for the simple sake of the truth, and wanting nothing but the truth, as far as I could understand it, I collected and classified facts as I found them, and these are the deductions therefrom.

As to how far your judgment will approve my deductions, let my sketch of the life history of the epidemic at Gainesville, Florida, occupy your attention, and then judge for yourselves.

As I have cut this history down, to save time, if any part be too sketchy on important points, I shall be pleased to give further details thereon:

First, as to cosmic conditions—

Quite recently there have appeared statements that there was evidence of periodicity in widely extended epidemics, and that there was probably an influence outside of the ordinary conditions for health; and beyond the reach of quarantine. It has been called a pandemic wave. Statistics of epidemics running back more than a hundred years, when graphically tabulated, show periodic wave crests, with ripples or smaller waves between, and these wave crests appear at remarkably regular distances, having an average of eleven and a half years. From the statistics it was shown that the probable return of the wave to the United States would be in 1887, entering at the southernmost point of the Atlantic States and moving northwards. That the period would probably be four years; and, seeing that it did come to Key West in 1887, and more northwards to Tampa, and in 1888 further northwards to Jacksonville and other places, I expect to see it this year, 1889, in the latitude of Savannah and Charleston.

This period of eleven and a half years is the period of maximum and minimum sun spots, also of greatest heat and cold, and other phenomena.

Permit me to call your attention to other diseases in

epidemic form, co-existent with yellow fever, and also the unusual epidemic of accidents.

Call it what you will—there exists a something, from which nothing can save; precautions may mitigate, they cannot obviate.

In positions where yellow fever is always present, its complete history is never known, because it never dies. In centers of trade, where it is usually widely spread before being publicly known and recognized, its history is incomplete, and confused with other forms of disease.

Instances of complete isolation and a complete history are rare. The epidemic at Gainesville, Florida, offers nearly a complete case.

The entire community were on guard in some way; every one was aware of the existence of the fever in the State; and also of the importance of keeping Gainesville free, as it was the only outlet giving to travellers from southern countries a route distant from known infection.

An unusually long drought prevailed during the early summer. The rainy season did not set in until August, then came, almost daily, a deluge. The atmosphere was highly charged with moisture, and fungi grew everywhere. Rooms closed for a day or two took on a bad odor. Bedding smelt mouldy even in well aired rooms. Clean beds were really disagreeable from the mouldy smell.

Just here let me digress a moment to state that five cells containing a saturated solution of bichloride of mercury, used to amalgamate battery zincs, was completely covered with a film. An examination of this film under the microscope showed a cell formation. I intended watching the growth of this unexpected phenomena, but public measures prevented. Fungus and lichen thrived, but there was no sickness; the health of the community was unusually good; the doctors had nothing but old or chronic cases; only three were in practice, where at other times there had been eight.

There was widespread complaint of slight nausea, pain in

the forehead and in the back of the neck; rarely enough to be severe or disabling, but distinct. In every case after recovery from the fever these symptoms left.

There was another marked symptom; mental trouble that I wish to speak of as possibly referable to the pandemic wave; a sudden awakening, without being conscious of having slept, or a consciousness of a momentary lapse of mental action—it is indescribable—but at this time I noticed railroad and other accidents occurring as if they too were epidemic.

In the testimony of the men, one stated that he saw the signals, but did not realize their importance until too late; why, he did not know. Others stated that they could not tell why they did not do as usually they had done for years before.

Is there in these cases a mental lapse; a momentary suspension of brain action? It was certainly one of the symptoms of yellow fever; a momentary failure to realize facts presented, followed by quick apparently normal action of thought, in total ignorance of previous lapse.

Sanitary measures were pushed to an extreme, in some directions; some matters were ignored; badly drained depressions and choked ditches retained the water that filled them until it was absorbed or evaporated. The city is situated on high ground, with good natural drainage.

At the northern boundary a stream rises, passes under the S. F. & W. R. R., runs east, then south, when due east of the public square it is about 400 yards distant, and is thirty feet below the square. It passes under the F. R. & N. R. R., then under the Fla. Southern R. R., and when due south of the transfer depot it is seventy feet below its source. Another stream rises in the northwest part of the city and runs west, with a fall of thirty feet in half a mile. Still another stream rises in the western part and flows south, with abundant fall. Gainesville occupies the highest land between the gulf and Atlantic ocean, lying north of the peninsular notch, its elevation is about two hundred feet

above sea level. Into the streams above mentioned, ditches conduct the service water. There is no complete system of drainage; no sewerage.

When the guard's sickness caused alarm, plans were made to leave the city if it proved to be yellow fever. It was so announced at the churches on Sunday evening September 16th, and all night long hurrying crowds filled the country roads, and by morning few remained. I was one of the few. On October 1st I wrote and published the following for information of refugees and others interested :

GAINESVILLE'S FEVER—AN EFFORT TO LOCATE THE CAUSE OF IT.

The death of Maj. N. R. Gruelle, after three days of yellow fever, has caused a stampede among the few remaining citizens of this place, cast a deeper gloom around us, and shaken the faith of those who relied implicitly on the non-infection high pine land theory.

Theories appear to be all sadly at fault in this yellow fever matter. Doctors disagree and experts are at variance.

After all the experiences of past epidemics, it is reasonable to expect that medical men should readily recognize the fever in its incipency, take promptly a definite line of action with a high average of favorable results, and so inspire confidence. But since this is not so, there must be a grave fault somewhere. Is the fault with the doctors? The doctor's proper realm is the treatment of disease when it appears, not the prevention of its appearance. From variety of surroundings cases may be complicated with other forms of fever, thus varying the symptoms, and so the indications in the experience of a doctor in one locality may differ essentially from that of another not similarly located, and thus may arise honest difference of opinion.

There is needed careful investigation, an assemblage of facts, well authenticated, carefully classified and compared regardless of any theory or any one's reputation. Such investigation should be made by residents of some years within the area of probable epidemic action. Experts, of however high repute elsewhere, are sadly misled by mistaken ideas in unfamiliar surroundings, and oftener avoid than invite necessary information from those best able to give it in the form in which it will be most useful.

A large number of plain, simple statements of the first symptoms, and the progress of the disease, obtained from intelligent persons who have passed through the ordeal of yellow fever, might be collected, classified for similarity and variation, and deductions therefrom be put in useful form for public distribution. A similar work by doctors is evidently ad-

visable. Unfamiliarity with symptoms and widely varying methods of treatment form the elements of the wild terror inspired by the possibility of being a victim to yellow fever. Thoroughly isolated cases, either as communities, families, or individuals, should be sought out as being best calculated to give a definite, useful series of facts.

The case of Gainesville is, to some extent, thus isolated. A company of men in ordinary health are absent five days, their whereabouts during that time is strictly well known. They return nearly all sick. All apparently recover except six; these develop yellow fever. They, with the friends or relatives who happened to be with them, are isolated. The fever takes its course. None of the attendants, not even in the case of fatal termination, take the disease. In one case the outbreak is delayed and terminates in death. Again the attendants escape.

Here we have one prominent fact, verified by seven isolated and distinct instances, in which yellow fever is brought from afar and introduced into the midst of a thickly inhabited region, passes through all its stages there without communicating itself to those in immediate, continuous and prolonged exposure to its influence.

Seven such clearly defined cases may rarely be found, and they form a nucleus around which to assemble similar ones when found; and from all to try to ascertain and understand the conditions of this immunity for future guidance.

The question naturally arises here: Did these cases contain the elements of contagion? and further, what are the conditions necessary to immunity and to contagion?

Here, sad to relate, we are not without positive information.

When a week or more had passed the board of health deemed it advisable that the houses of refugees, which had been closed, should be opened and fumigated.

Maj. N. R. Gruelle volunteered to perform this work. He told the writer that he found in several houses a fetid odor from decaying food and other matter left in the stampede. This he and his assistants removed before fumigation.

In this work he hurried from place to place and over-exerted himself, as shown by his perspiring condition and fatigued appearance on a very hot day. Being asked why he did not keep out of town he replied, "I am not afraid of the yellow fever spreading in this pure atmosphere." Turning to your correspondent, he said, "I do not really know how far I have been exposed, and I don't want to go beyond prompt help."

Maj. Gruelle and Dr. Fitch Miller were intimately associated in business. The major's office was in the same building where Mr. Ammon's room was, using the same entrance. Dr. Miller's death from the fever was a sad blow to him, and deepened the fear of his possible infection. He was stricken down with the disease and on the third day he died.

We can trace Maj. Gruelle's whereabouts every day during the period of the fever brought by the guards, and know that he had not been absent from here during that time, nor for some time previous, nor had any member of his large family been away recently.

The evidence appears to be conclusive that he was infected by the fever brought here by the guards, consequently, *the fever was communicable in its most fatal form*. Here we are met by one of those difficulties which beset the path of investigation. Those in the constant presence of the disease escape without any trace of its effect on themselves; another, after questionable exposure, is smitten to death. There must be a reason for this. Yellow fever must act in accordance with nature's fixed laws, and these laws are not, presumably, past finding out.

We have here from the same introduction, cases of complete non-infection, and also fatal infection. Can we separate them? Like causes under like conditions invariably produce like results. Here we have a given cause, but opposite results.

The results being different whilst the cause remains the same, the conditions must be different. If we can find any marked difference of conditions in these cases, it may form a guide to further investigation elsewhere, and the recurrence of similar conditions where the fever has become epidemic, may mark a step in progress toward the recognition, avoidance or removal of that one condition conducive to the spread of this hitherto untamable horror.

As soon as the cases were decided to be yellow fever, all persons in the houses infected were confined therein, none allowed to go in or out, and nothing to pass out; complete isolation was strictly enforced by armed guards.

In these houses conditions for infection presumably did not exist.

What possible difference of condition could Maj. Gruelle have encountered? His residence was nearly one mile east of the court house, just outside the city limits, and less than 200 yards beyond the house of Mrs. Evans, where her son, Lieut. Evans, died of the fever. Between these two houses there was a low place, where water stood after heavy rains.

The major mentioned this wet place to your correspondent and said that it had puzzled him as to which was best to do, to dig a ditch to drain the water, and so expose fresh earth to the atmosphere, or let the water stand and evaporate and stagnate; that he had, however, decided to dig the ditch, and it was being done then.

Now for difference of conditions. We have several persons isolated with cases of yellow fever, but they are neither over-worked physically, exposed to foul atmosphere of closed rooms, to night air, neighborhood of stagnant water or emanations from freshly moved wet earth in the immediate vicinity of a virulent case of yellow fever.

But we find that Maj. Gruelle encountered all of these; the exposure

to night air was only the chilly time of the late evening, but at that time he passed into and through the atmosphere over the wet spot.

Now, are all of these conditions, or only one, conducive to the spread of yellow fever? Mr. Gruelle's assistants were as much exposed to the air in the closed rooms as he was; none of them are sick. Others were very tired from over-exertion, got home as late as he did, but are still well. If the wet atmosphere is the condition others should then be also infected by his presence and favorable conditions. They are. Two members of his family have the fever.

The inference is thus warranted that one of the conditions under which yellow fever can spread is produced by the evaporation of water from freshly stirred wet earth, or from dead vegetable matter.

This is only an inference, but it directs inquiry to other places where the disease has spread, and suggests the question: Is there always an area of fresh earth, or dead vegetable matter, wet enough for long continued evaporation? and, does the fever exist there when these spots are dry?

Let us inquire of Plant City. We are informed that this place is of recent origin and rapid growth, situated in a hitherto healthy pine region. There are large areas of pine sawdust in shallow wet places; but pine sawdust, we are told, is healthy to have around.

Let us look at Macclenny. It is the same condition. The sawdust there has been spread over the streets, fresh land has been cleared, pine stumps, limbs and roots are passing through ferment to decay in the immediate vicinity. What of Jacksonville? We find no large areas of sawdust there. There are handsome streets, clean as can be in any business city, and it is situated partially on high sand ridges, with the broad St. John's river on one side and arms of the river on the other, with natural drainage in both directions. What can cause the epidemic there? We must hunt for something different, possibly akin to conditions noted elsewhere.

At the wharves and railroads there is a large area of dead vegetable matter exposed, but it is dry; in the marshes there is a large wet area, but it is covered with living vegetable matter. The marshes have been built out upon, the river margin has been built out upon. Has any new work been done? No. What is the material of the filling? Principally slabs, refuse from saw mills, sometimes covered by a layer of earth, and sometimes by a cover of plank.

Let us examine this pile of the road blocks used in the streets. Cypress trees about the size of large telegraph poles are cut into blocks about five inches long. These are placed end up on boards, the crevices filled with small pieces and sand. It is claimed that, being made of cypress, there would be no rotting, and consequently no danger of disease from these blocks.

There was no epidemic in Jacksonville until August.

During the early summer there was an unusually extended drought. The rainy season set in in August.

The conditions we find in Jacksonville are that these road blocks furnish acres upon acres of dead vegetable matter. During the early part of the hot season the blocks were dry. When the rainy season sets in they present an immense surface for evaporation, each block being a miniature sponge. As long as this surface was dry there was no epidemic. As soon as it became saturated with water the conditions for continuous evaporation over a large area were complete, and coincident therewith the epidemic began. If then, on the return of dry weather the epidemic abates, it will further corroborate the evidence that evaporation of water from a surface of dead vegetable matter, under a suitable temperature, is intimately associated with conditions favorable to yellow fever in epidemic form.

The evidence, however, is not conclusive. It is circumstantial, showing coincidences that are very suspicious, and apparently presents a clew leading to the discovery of the truth. Such investigation, continued, will surely lead to a better knowledge of conditions. Then their avoidance will follow, and a modification of the ravages of the disease must result, and all the attendant horrors of stampedes, quarantines, etc., become tales of the past.

Let us return to Major Gruelle's family. The family was moved to another house, about three hundred yards distant from their own. This house was situated on a lot that was formerly a pond; a large ditch ran along the valley near the house. After a few days the members of the family not sick were taken to the quarantine hospital; leaving two sick at the house; one of these died. None of the attendants at this house at this time were sick. This house was used as a pest house, and other cases were moved into it; there were two deaths there; one attendant was taken sick there. Later after some warm misty weather there were at the two heads of the ditch, four cases, one fatal. Still later after a few days of foggy weather, there was a case in a house on a sandy ridge, about two hundred yards from this pest house, a large family of children remained in the house, none of them or the attendant took the disease.

Two of the original cases of guards show no subsequent cases traceable to them; both were in thickly populated neighborhoods, one on a sandy ridge, and no precautions taken with fecal matter, the other on rich soil, but all fecal matter chemi-

cally treated. Two cases were in one house, no attendants were infected, the last case of the guards was also moved here, it was fatal ; all survivors were moved to the quarantine hospital. The fecal matter of these three cases was disposed of at the closet at the back of a small garden. After the house was vacated, two persons visited the lane close to the closet, they both took the fever ; at their homes none of the family took it from them. A colored man slept in a room near this closet ; he took the fever.

The other two original cases show the same immunity of attendants. Near the house occupied by one of these, is a ditch leading to a larger ditch ; these were nuisances ; disinfectants had been freely used in them. After a period of wet and foggy weather, the fever entered a family living near the ditch, and father, mother and daughter died in quick succession. The mother and daughter had attended the father ; two sons escaped. In another house right on the ditch a man and his wife had the fever, the husband died, the wife recovered.

By this time the foci were so numerous that the whole city was considered poisoned. The U. S. M. H. service was in charge of the place.

In the beginning precautions as to complete isolation and non-communication were observed, and enforced by arms, and carried to the extent of taking all relatives away from the sufferers and placing hirelings in charge, and allowing those taken away to take no other clothing than that upon them ; and, as no other was provided, smuggling was carried on ; clothing direct from infected houses was obtained and worn, and no evil effects followed.

From avoiding the street where a yellow flag waved, through every gradation of crossing to the other side, not crossing to barely noticing ; and from a wild terror of one stricken down, to sitting by the bedside, are the gradations through which our people passed. From non-intercourse to no restriction whatever. All of these changes in conduct appeared to make no change in the epidemic ; an examination of the chart gives no evidence of these changes.

When the epidemic was at its worst the State and National election came on, and the polls were opened for Gainesville in a house where it was afterwards known that a concealed case of yellow fever had been.

Here were the usual crowdings of elections, persons with distinct symptoms of the fever on them were seen here, and an outbreak was expected; but it did not come. One of the family occupying the house, the wife of the man who was sick there before, subsequently had the fever; but no case was traceable to this mixing up of people from the infected and non-infected places.

A census showed only 150 whites and ——— colored people within the city limits. Business was done between the hours of 9 and 3, and on sunshiny days many persons came in between these hours; and, no case was reported where these hours, in fine weather, were adhered to; but several cases occurred from visits made in wet and foggy weather. Much of the weather during the latter part of October and in November was wet; in November very wet.

Speaking of the house lots, the infection began in the cleanest places in the city, in the ordinary meaning of cleanliness. Shall I be understood if I say, the soil, the dirt was clean? Continued rains made the soil wet; during the epidemic it was rarely dry; and often flooded to saturation, so that drainage was slow, but the temperature remained high. Up to the middle of November the weather was warm, never below 75 degrees Farenheit, often 85.

On the 20th November it turned cold, there followed a reduction of cases within the next two days; on the 23d there was no case reported for the first time since October 25th. Two were reported November 24th, 25th none; we had the first ice on this day; during the next night the temperature was still lower and by morning ice formed one-fourth inch in thickness. On this day, November 26th, three cases were reported, 27th one case, 28th two, and this ended the epidemic.

The chart shows a periodic grouping in the beginning of the epidemic, further on it becomes fuller between groups and

probably in a longer continuance there would have been such an overlapping of periods as to show no grouping at all. These groups appear to have some significance; especially as the epidemic ceased within a group period, after the first frost. If the chart groups show the period of incubation, then seven days, dating from exposure, is the least period of safety for quarantine of persons.

As the character of the surroundings of residences of those attacked with the fever, appeared to have a decided influence, not only on the spreading of the disease, but in intensifying its effects, I have classified the cases of the whites under the heads, Wet surroundings: which includes proximity of drains or ditches, and dry surroundings.

This shows,

Wet surroundings 14 cases, 9 deaths, 5 recoveries.

Dry surroundings, 30 " 3 " 27 recoveries.

Nearly all wet surroundings were temporary, the result of long continued rains.

The dry surroundings were the results of higher positions, or more porous soil.

It is an interesting question, whether or not the fever would have spread beyond the original cases had the weather been dry.

The introduction of skilled nurses, was by far the most important of all the measures taken for relief and care of the sufferers. The nurses are held in grateful remembrance in Gainesville. They inspired confidence, gave hope, and the much needed practical instruction.

The physician cannot be the nurse, and skilled nurses cannot be improvised. Kindness to the sick, it was found might, when unaccompanied by proper knowledge, be as fatal as neglect.

Bedding and clothing used without disinfecting beyond ordinary washing and airing, gave no trace of infection; even bed-fellows were not infected where the fever was brought home by one of them.

I can trace no case where the disease was carried from an

infected spot by anything, or any means other than a sick person who was him or herself infected.

In the light of the information displayed by the epidemic of yellow fever at Gainesville, Fla., quarantine against this particular disease should be directed to human beings and fluids, wet, or moist material from infected regions, and that when the disease is introduced to a community, all fecal matter from the diseased persons, and suspects, should be chemically disorganized, and placed in a special receptacle; this to be removed for further disposal; preferably by fire for extra precaution.

Under such a regime business becomes enfranchised within certain definite limits. Traffic is continued under definite regulations. Travellers can know beforehand definitely the period of their legal detention, and make provision therefor. And thus the curse that fell upon the little city on the hills of Florida may become a blessing to the people who so generously extended their kindness to her, in her sad hour of need.

APPENDIX V.

RESOLUTIONS OFFERED BY MR. B. R. FOREMAN, OF NEW ORLEANS.

Resolved, That it is the sense of this convention, that the time has come when Federal Resources and Federal power should be organized and exercised to regulate and control Inter-state as well as foreign quarantine, and to prevent the introduction and extension of contagious and infectious diseases in the United States, and to this end, there should be passed an act by the Congress of the United States, for the appointment of a "chief commissioner of health of the United States," who should be charged with the collection and distribution of information relative to contagious and infectious diseases, and have the direction of the sections of the health commission when on active duty.

There should also be a health commission, to be divided into six sections ; each section to be especially devoted to directing the investigation of the disease with which it is charged, indicating cause, origin, mode of extension and measures of prevention :

1. One section for yellow fever.
2. One for cholera.
3. One for typhoid fever.
4. One for scarlet fever.
5. One for small-pox.
6. One for diptheria.

This health commission should adopt rules and plans for the prevention of the introduction into the United States of contagious and infectious diseases, and the prevention of

their spread from one state into another, and the regulation of inter-state communication during a threatened epidemic.

Whenever an epidemic of any of the diseases named is threatened, the governor of any state may call upon the chief commissioner of health, who shall then, with the aid of the section of the health commissioner devoted to that particular disease, enforce and carry out the methods and regulations adopted by the health commission for that disease, and thus concentrate the powers and resources of the Federal Government, in aid of state and local authority, for the prevention of the spread of contagious and infectious diseases, in a peaceably, orderly and effective manner.

APPENDIX VI.

REMARKS OF DR. W. G. AUSTIN, OF NEW OR- LEANS.

After the remarks made by Dr. Hyer, of Miss., in regard to the National Board of Health work in 1878, Dr. W. G. Austin, of Louisiana, asked permission of the Conference to make a statement in regard to the work done by the National Board of Health, in aiding the Louisiana State Board in stamping out the fever in 1879. He stated that the National Board of Health was not organized for work in 1878, and not until late in 1879. When the fever made its appearance in the fourth district in New Orleans the State Board had exhausted all its means in the epidemic of the previous year. We were in need of money to do the work necessary to stamp out the disease. We applied to the National Board for funds to aid us in carrying on this work; they promised us aid in two weeks. We could not wait.

Through the assistance of General Manager J. C. Clarke, of the Illinois Central Railroad, Dr. Herrick, the Secretary and myself, Acting President of the Board, borrowed the money from the Canal Bank to do the work until the National Board could come to our assistance, which they did in about ten days, enabling the State Board of Health, with the assistance of the Auxiliary Sanitary Association of New Orleans, to stamp out the disease in a short time, thus preventing a repetition of the dreadful epidemic of 1878; the National Board furnishing us money to pay our indebtedness to the Canal Bank and all other expenses incurred.

On visiting the Hood residence after the death of Gen. Hood, his wife and child, with Dr. Bell, of New York, we

found the balance of the family sick. Upon examination we ascertained there was under the house an immense cess pool, in which was emptied all the feculent matter coming from the water closets above. This vault had no ventilation whatever, for the gases to escape, thus accounting for the walls of the house being perfectly saturated with the gasses produced from human feculent matter. The vault proved to be about ten feet square, lined with cement and covered with a large stone also laid in cement. With great difficulty we removed the stone, when the gas coming from this vault put out all our lights and drove the force from under the house. We emptied the vault, disinfecting it thoroughly, putting in large quantities of carbolic acid, sulphate of iron, chloride of lime and quick lime, then filled it up with river sand and had all the pipes changed to a new vault which we prepared outside of the building.

At the suggestion of Dr. A. N. Bell we moved the sick children on the other side of the hall, and they all recovered under the treatment of Dr. Bemiss, who was the physician of the Hood family and a member of the National Board.

The fever of 1879 had evidently wintered over from the previous year, for the reason that it commenced exactly where it had left off in 1878. The odor from the walls of the rooms was so strong that Dr. Bell remarked that he would not live in the house if it were made a present to him.

I make this statement for the reason that I was not correctly reported in my remarks made yesterday, to show that the work by the National Government, in aiding State Boards of Health, will prove a success, judging from the aid given the Louisiana Board in 1879.

APPENDIX VII.

HUNTING YELLOW FEVER GERMS.

BY DR. GEO. M. STERNBERG, U. S. A.

Gentlemen—It would have been far more satisfactory to you and to me if the subject of my address this evening could have been announced as “the yellow fever germ.” I need hardly say that nothing would have given me greater pleasure than, in the presence of the experts in the clinical and prophylactic management of yellow fever here assembled, to exhibit microscopic preparations and pure cultures of the specific infectious agent which I have been so long in search of. I shall show you presently upon the screen photo-micrographs of a variety of micro-organisms which I have encountered in the course of my researches, some of which are hitherto undescribed species, and among them some which have especially engaged my attention as possible yellow fever germs. I shall also show you cultures and photo-micrographs of the micrococcus presented to me by Dr. Domingos Freire of Brazil as his microbe of yellow fever, of the tetragonus febris flavae of Dr. Carlos Finlay of Havana, and of the bacillus of Dr. Paul Gibier of Paris.

But I must announce to you in advance that there is no satisfactory evidence that any one of these micro-organisms is the veritable infectious agent in the disease under consideration.

I at first hesitated to accept the invitation extended to me to address you on this occasion, inasmuch as my investigations have not led to any definite result, and as they are still in progress, and will be continued in Havana during the present summer. But the importance of the occasion and the solicitation of my good friend Dr. Cochran, the efficient health officer of the State of Alabama, have induced me to come here for the

purpose of making a brief statement relating to the present status of the investigation with which I am charged, and especially for the purpose of demonstrating to you the methods of research employed by bacteriologists in investigations of this nature.

I may say before going any further, that my faith in a living infectious agent as the specific cause of this disease is by no means diminished by my failure thus far to demonstrate the exact form and nature of this hypothetical "germ." The present state of knowledge with reference to the etiology of infectious diseases in general, and well-known facts relating to the origin and spread of yellow fever epidemics fully justify such a belief. The *a priori* grounds for such faith I stated as long ago as 1873, in a paper published in the *American Journal of the Medical Sciences* (July, 1873); and the progress of knowledge since that date has all been in the direction of supporting this *a priori* reasoning. But yellow fever is by no means the only infectious disease in which satisfactory evidence of the existence of a living infectious agent is still wanting. In the eruption fevers generally no demonstration has been made of the specific etiological agent—at least none which has been accepted by competent pathologists and bacteriologists. Again, in the infectious disease of cattle, known as pleuro-pneumonia, notwithstanding very extended researches by competent investigators in various parts of the world, no satisfactory demonstration of the germ has been made. The same is true of hydrophobia, in which disease we are able to say with confidence, the infectious agent is present in the brain and spinal cord of animals which succumb to rabies; this infectious agent is destroyed by a temperature which is fatal to known pathogenic micro-organisms (65°C), and by various germicide agents, yet all efforts to cultivate it or to demonstrate its presence in the infectious material by staining processes and microscopical examination have thus far been unsuccessful.

You are aware that my first effort to solve the etiology of yellow fever was made ten years ago. As a member of the Havana Yellow Fever Commission of the National Board of

Health, I had an opportunity to make researches which, in advance of the effort, I fondly hoped might lead to a demonstration alike creditable to American science and useful as a basis for preventive and curative measures in this pestilential malady, which has destroyed the lives of so many of our fellow citizens, and has so largely interfered with the material progress of certain sections of the United States. I knew from personal experience the malignant nature of the disease, and the futility of the various modes of treatment which had been resorted to in the effort to combat it. It was therefore with the deepest interest, as well as with strong hopes of success, that I went to an endemic focus of the disease to search for the yellow fever germ. The recent (1873) demonstration of the spirillum of relapsing fever in the blood of patients suffering from this disease, and the recognized facts relating to the etiology of anthrax, considered in connection with the current notions relating to the pathology of yellow fever, lead me to hope that the discovery would be an easy one. I was familiar with the most approved methods of mounting and staining micro-organisms, and was provided with the best high power objectives that could be procured—the one-twelfth and one-eighteenth homogeneous oil immersion objectives of Karl Zeiss, of Jena, Germany. Not only did I feel that I was equipped for the recognition of any micro-organism which might prove to be present in the blood, but I was prepared to photograph it, and thus to show to others what I might see in blood drawn from the circulation of yellow fever patients. You know the result of this investigation—"ninety-eight specimens from forty-one undoubted cases of yellow fever were carefully studied, and one hundred and five photographic negatives were made which showed satisfactorily everything demonstrable by the microscope." But no micro-organism was discovered. I shall presently show you upon the screen a photo-micrograph of yellow fever blood, made in Havana at the time mentioned, so that you may judge of the performance of my Zeiss one-eighteenth inch objective, and have ocular evidence that no micro-organism demonstrable by this magnificent lens was present in it. I may

say here that my culture experiments, made in Havana last spring, in which blood taken from one of the cavities of the heart, as soon as possible after death, was introduced into various nutritive media, gave a like negative result.

Out of ten cases in which I made the autopsy, in the military hospital at Havana, a development of micro-organisms occurred in two only. In the exceptional cases I obtained a bacillus which subsequent researches showed to be identical with a bacillus constantly found in the alimentary canal of healthy persons—*Bacterium coli commune* of Escherich.

The absence of micro-organisms from blood drawn from the finger during life, or from the heart after death, cannot however be accepted as evidence that there are no parasitic organisms any where in the tissues. The bacillus of typhoid fever, for example, is rarely found in the circulating fluid, although it must be transported in the blood current to the various organs in which foci of growth are found which contain numerous bacilli. Such foci are especially abundant in the spleen, but even in this organ many thin sections may be made before a single focus of development is encountered.

Having failed to find the yellow fever germ in the blood we may still admit that, as in typhoid, it is perhaps only to be found in the organs principally involved in the morbid process. This reasoning has led me to give special attention to an examination of the liver and kidney, both by the culture method and by the examination of thin sections. Both methods have given me positive results so far as the occasional presence of micro-organisms is concerned, but both are in accord in failing to demonstrate the constant presence of any particular organism. In my culture experiments made in Havana last year the micro-organism most frequently encountered was my bacillus α , already referred to as found in two out of ten cases in cultures from blood drawn from the heart. Naturally I have given much attention to this bacillus, and it was only after an extended series

of comparative experiments that I gave up the hope that it might be concerned in the etiology of the disease under consideration. These comparative experiments forced me to the conclusion that this is the same bacillus as was found by Emmerich in cholera cadavers at Naples, and that it corresponds with the *Bacterium coli commune* of Escherich.

In my researches by the method of staining thin sections of the tissues hardened in alcohol, I have encountered several different micro-organisms; but no one of these has been found in a series of cases. One, the bacillus of Lacerda and Babes, I have found only in material brought from Dr. Lacerda's laboratory in Brazil, and in two only out of nine cases represented by material from this source. In one of my Havana cases, in which the material was collected by my friend Dr. Burgess, in 1887, a long bacillus was found in the kidney, for the most part in the glomeruli. In a case in which I made the autopsy in Havana last spring a micrococcus, grouped in fours, was found in the kidney.

Evidently, if any one of these micro-organisms was found in a considerable series of cases, the fact would be decidedly significant, and would afford presumptive evidence that the parasitic organism found bore some relation to the morbid process. But, even if one and the same micro-organism was found in every case, the final proof of its etiological import would depend upon its isolation in pure cultures and the production of the characteristic phenomena of the diseases in one of the lower animals—or in the absence of a susceptible animal, in man himself.

The method by cultivation is by far the most reliable for the demonstration of micro-organisms which will grow in our culture media, for isolated cocci, or bacilli might easily escape observation when present in small numbers, but would serve to start a culture. Thus the bacillus of typhoid fever, which, as stated, is not as a rule found in the blood of the general circulation, and is only found in the spleen in scattered clumps, may be obtained from this organ, in pure cultures, almost without fail, by introducing a small quantity of splenic pulp into a suitable nutritive medium.

Moreover, this method enables us to differentiate micro-organisms which look alike, and which by microscopic examination alone it would be impossible to distinguish, one from another. This is a fact now well recognized by bacteriologists, but not generally appreciated by microscopists whose researches have been limited to the staining and mounting of sections.

Both methods require skill and practice in the execution, and great caution in drawing conclusions, for there are a thousand traps lying in wait for the explorer in this field of investigation.

It is for this reason that pseudo-discoveries are so numerous.

Especial care is required in the microscopical examination of stained preparations of yellow fever tissues. One encounters in the urinary tubules, mingled with the debris of the desquamated epithelium, stained masses of various forms which often closely resemble cocci or bacilli. These I believe to be fragments of nuclear material. The same material is often massed in the urinary tubules in the form of plugs, which are deeply stained by the aniline dyes.

Again, fragmentation of nuclei of cells still in position may give the impression of a cell containing cocci; and the karyokinetic figures found in the cells, especially in the liver, often resemble bacilli so closely that it is difficult to convince any one not familiar with them that they are not micro-organisms.

The "plasma cells" of Ehrlich, also, seem to have as their chief function the role of deluding amateur microscopists into the idea that they have made a discovery. They are often very abundant in the liver and in the kidney of yellow fever cases, and so closely resemble zoogloea masses of micrococci that experienced pathologists have been deceived by them.

In addition to these objects which resemble micro-organisms there are dangers from the postmortem invasion of the tissues when the autopsy has been delayed beyond an

hour or two, in the warm climates where yellow fever prevails; or even in the preserving medium, or during the process of staining.

My experiments made in 1883, showed that "exposure to ninety-five per cent. alcohol for forty-eight hours did not kill the bacteria in broken-down beef tea (old stock) and pathologists are familiar with the picture presented by the postmortem invasion of tissues which have been left in alcohol which was not strong enough to preserve them.

Finally, inasmuch as my culture experiments with material collected soon after death, from the liver and kidney, gave a positive result in a certain proportion of the cases, it is evident that the micro-organism most frequently found by this method—my bacillus *a*—should occasionally be encountered in stained preparations.

The possibility remains that by some method of staining not hitherto employed, the specific infectious agent may yet be demonstrated in the tissues; but the fact that my culture experiments with material from the liver and kidney of ten cases failed to demonstrate any such specific microbe is opposed to this view. We may, of course, suppose that the yellow fever germ not only requires special methods, yet undiscovered, for its demonstration in the tissues, but that it will not grow in the culture media which I have employed in my researches. I would say in reply to this hypothesis that all known pathogenic micro-organisms may be demonstrated by the staining methods employed, and that, inasmuch as the yellow fever germ appears to find a favorable nidus in filth beds external to the body I have been inclined to believe that like the bacillus of typhoid fever and cholera it is not especially nice as to the character of the medium in which it may develop. However, this may be a mistaken idea, and I propose in my future researches to make use of various culture media not yet employed, and especially to make cultures from the tissues and the excreta in an atmosphere from which oxygen has been excluded; for it may be that like the bacillus of malignant

oedema and the bacillus of tetanus the yellow fever microbe is anaerobic.

While then, I admit that by some special method of staining, or by a modification of the culture methods heretofore employed, the specific infectious agent we are in search of may yet be found in the tissues of yellow fever patients, I feel justified in saying that no such demonstration has yet been made. The negative results attending my researches in this direction have led me to turn my attention to the micro-organisms present in the alimentary canal, for the possibility suggests itself that this may after all be the habitat of the deadly yellow fever microbe, which is capable of destroying life within two or three days, and that the phenomena of the disease are not directly due to its presence in the body, but result from the absorption of a poisonous ptomaine produced by it, as appears to be the case in cholera.

The famous English hygienist Parkes, from the consideration of evidence relating to the prevalence of yellow fever during a series of years among English troops stationed in Jamaica and elsewhere within the "yellow fever zone," in connection with the sanitary condition of their barracks, arrived at the conclusion that yellow fever is a "fœcal disease," and there are many facts relating to the origin and extension of epidemics which seem to support this view—that is the belief that the germ finds a proper nidus in fœcal matter external to the body. If in yellow fever, as in cholera, the infectious agent is located in the alimentary canal of those who fall sick with the disease, we can readily understand how it is that new centres of infection are developed, when external conditions are favorable, in the localities where imported cases have occurred, or as a result of the introduction to such localities of fomites.

This view also accords with the demonstrated fact that yellow fever is not directly communicated by the sick to those in attendance upon them. Pathogenic germs which multiply in the intestine no more endanger those who are associated with the infected individual than the same micro-

organisms cultivated in a suitable medium in a test tube endanger the bacteriologist who is engaged in their study.

The possibility that the infectious agent in yellow fever may have its habitat in the alimentary canal, occurred to me several years ago, and I determined, in advance of my visit to Havana last spring, to give special attention to a bacteriological study of the intestinal contents.

It is well known that the excreta of healthy persons contain a vast number of micro-organisms of various species, and that while some of these appear to be constant, others are occasional, and we may say accidental tenants of the human intestine, being introduced, no doubt, with the ingesta and especially in drinking water.

Notwithstanding the researches of Brieger, of Bienstock, of Escherich, of Vignal and others this bacterial flora of the healthy intestine is still imperfectly known. The attempt, therefore, to explore this field for the purpose of finding a specific microbe in any particular disease is attended with very great difficulties, unless, as in cholera, this specific microbe occupies the field to the exclusion of the ordinary bacteria found in the intestinal contents. Koch found his "comma-bacillus" almost in pure cultures in the characteristic rice-water discharges of cholera patients, and other bacteriologists, following his methods, have had no difficulty in verifying the presence of the same micro-organism in cases of cholera occurring in various parts of the world. On the other hand, extended comparative researches, including my own investigations, made in Havana and in Decatur, show that the "comma bacillus," or rather spirillum, is not found in the alvine discharges of healthy persons, or in other diseases than cholera. If in yellow fever, as in cholera, there was a micro-organism in pure cultures, or in relatively great abundance, capable of growing in the culture media which are suitable for the development of a majority of the known pathogenic organisms, I ought to be able, to-night to exhibit to you cultures and photo-micrographs of this micro-organism. But my

researches show that the micro-organism which is by far the most abundant, and so far as my investigations go the only constant form found in the excreta of yellow fever cases, is the *Bacterium coli commune* of Escherich; which is also the most constant and abundant form found in the excreta of healthy persons.

In Havana, my cultures were made from material from the stomach and intestine of fatal cases obtained at the time of making the autopsy. My researches did not show that any of the micro-organisms encountered was constantly present with the exception of the *Bacterium coli commune*—my bacillus *a*. Having excluded this bacillus by comparative researches there was nothing to point to any one of the micro-organisms present in my cultures as the probable infectious agent I was in search of.

The bacillus of Dr. Paul Gibier I only encountered in three cases out of ten, and in these it was not present in very great abundance, compared with the colon bacillus for example.

My time in Havana, limited by my orders, was too brief to enable me to make an exhaustive research. The epidemic in Florida and Alabama during the past summer gave me an opportunity to continue the investigation, and, at my request, I was directed to proceed to the infected district for this purpose. The presence of my friend Dr. Jerome Cochran, state health officer, at Decatur, decided me to locate my laboratory in that place, where I found abundant material for the researches which I had in view. Having made a considerable number of autopsies in Havana, I determined while in Decatur to devote my attention especially to a bacteriological study of the alvine discharges collected during the different stages of the disease.

Evidently if the infectious agent multiplies in the intestine, it should be found in the excreta during the earlier stages of the attack.

The cause must be present in advance of the development of the morbid phenomena which characterize the disease. But, it is quite possible that during its later stages the etiological

agent has perished, and therefore would not appear in cultures made from material obtained post mortem.

While in Decatur, and after my return to Baltimore, I examined, by bacteriological methods—Esmarch tubes—the excreta of thirty-nine cases of yellow fever, and for comparison, of nine convalescents and of nineteen healthy individuals. A detailed account of the results reached will be given in my final report. As was to have been expected, I have encountered a variety of micro-organisms. Many of these I have isolated in pure cultures and the biological and pathogenic characters of several have been carefully studied by cultivation in various media and by inoculation experiments in the lower animals. It would be premature for me to attempt to give you the results of these researches, even if time permitted me to do so. But I may repeat what I said at the outset, that the germ of yellow fever has not yet been demonstrated. It is possible, however, that one or the other of the micro-organisms which I have isolated is the long-sought germ, although I have no satisfactory evidence upon which to base a claim that this is the case.

My attention has been especially directed to the liquifying organisms found in the excreta of the thirty-nine cases examined. In a majority of these cases the presence of liquifying bacilli was demonstrated, but liquifying colonies were not numerous as compared with the non-liquifying, among which the colon bacillus of Escherich was by far the most abundant. In a series of Esmarch tubes No. 1 would show numerous liquifying centres, usually within twenty-four hours; very often No. 2 would contain a few liquifying colonies; while as a rule No. 3, although containing numerous isolated colonies of the colon bacillus, did not contain any liquifying colonies. Further, I found that several different liquifying organisms were present in different cases, or were associated in the same case. I shall presently show you cultures and photo-micrographs of these liquifying bacilli. The one most frequently present, my bacillus *o*, I have since found in cultures from another source and am obliged to exclude it as the possible specific etiological agent

of yellow fever. It has also been isolated by Dr. Booker, of Baltimore, from the discharges of one or more infants suffering from summer diarrhœa. The bacillus of Gibier I have only isolated from three cases, and in these it was not present in considerable numbers. I have made extensive experiments upon the lower animals, which show that this bacillus has interesting pathogenic properties, but give no special support to the view that it is the specific germ of yellow fever. I have never observed in my cultures the black pigment, which, according to Dr. Gibier, is produced during the development of this bacillus, and am at a loss to understand this discrepancy in our observation.

So far as the pigment in black vomit is concerned, I have no doubt that it is of hæmic origin. I have never failed to demonstrate, by a microscopic examination, the abundant presence of red blood corpuscles in the numerous specimens of black vomit which I have examined. The little black flocculi, are in fact, made up of agglomerated corpuscles which have lost their pigment and appear as pale discs, often more or less swollen and distorted; while the brownish pigment, which has been changed by the acid secretions of the stomach, remains in their vicinity in the form of granules or amorphous masses. The idea that there is something specific about this pigment, or that it is the secretion of a specific microbe, as has been maintained by Freire and by Gibier, appears to me to be untenable. In a majority of the non-fatal cases of yellow fever, and in a certain proportion of the fatal cases, there is no passive hemorrhage into the stomach, and consequently no black vomit, yet these cases must result from the action of the same etiological agent as those in which this symptom is present.

I have found by experiment that the bacillus of Gibier, the micrococcus of Freire, and the tetragonous of Finlay, all grow after being exposed for an hour to a temperature of 15° C. Exposure outside of the laboratory in Baltimore for five days in the month of January, failed also to destroy

the vitality of these micro-organisms, although the temperature, during the greater part of the time at least, was below the freezing point.

Having thus given you a brief account of the present status of the investigation in which I am engaged, I propose to devote the remainder of the time at my disposal, to a practical demonstration of the methods of research employed, and to an exhibition upon the screen of the various micro-organisms to which I have referred.

NOTE.—The illustrations are necessarily omitted here.

APPENDIX VIII.

LEUCOMAINES AND PTOMAINES AND THEIR RELATIONS TO DISEASE,

BY

VICTOR C. VAUGHN, M. D.,

Professor of Hygiene and Physiological Chemistry in the University of Michigan.

We may divide the majority of internal diseases into two classes, the autogenous and the infectious.

By an autogenous disease we mean one which originates wholly within the body, and which is the result of disturbances of physiological processes. All living things absorb and excrete matter. In health there is perfect adjustment between absorption and excretion. Disturb this relation either by excessive ingestion, or by imperfect elimination and disease more or less marked results. The medical profession can understand and appreciate the force and importance of these assertions more fully now than it has been able to do at any time in the past. Recent investigations have shown us that poisons are constantly being generated in our bodies, and that in health we escape their ill effects by constant and sufficient elimination. A hasty review of some of the recent knowledge which has been gained on this subject may not be devoid of interest.

Peptones, which represent the first known step in the breaking up of the proteid molecule, when injected directly into the circulation act as powerful poisons. They destroy the coagulability of the blood, lower blood-pressure, and in large quantities cause speedy death. In health the pep-

tones formed during digestion do not reach the general circulation. In the liver they are robbed of their poisonous properties by being converted into globulin. But it is altogether probable that at times the liver partially fails in this function and that the health suffers in consequence. This may be due to the taking of excessive quantities of proteids, the digestion being active and the peptones formed and poured into the portal circulation faster than the liver can convert them into globulin; or it may be that from lack of exercise or other reason the liver is tardy in its action, or "torpid" as we say, and small quantities of peptones pass into the general circulation. The lassitude, depression, feeling of weight in the limbs, and dullness in the head occurring in the well-fed, inactive man after his meals, Brunton attributes to poisoning with peptones. The remedy is less food, especially less nitrogenous food, and more exercise. That some substances resulting from the proteids of the food is the cause of the trouble, Brunton thinks, is evidenced by the fact that "the weakness and languor are apparently less after meals consisting of farinaceous food only."

Brieger obtained by digesting fibrin with gastric juice a substance which gives reactions with many of the general alkaloidal reagents, and to which he has given the name peptotoxine. A few drops of a dilute aqueous solution of this substance suffice to kill frogs within fifteen minutes.

Thus, we see that poisonous substances are formed during normal digestion, and that in health we are not affected by them because they are rendered inert by further changes in their structure or because they are soon eliminated.

Pouchet, Bouchard and others have studied the basic substances found in the urine, and it has been shown that the poisonous character of this excretion is greater during the hours spent in work than in those spent in rest. In other words, the more vigorously the physiological processes proceed, the more rapidly are the physiological poisons generated.

Brown-Sequard has condensed the exhaled air of dogs, and has injected the liquid thus obtained into other animals, causing death. The symptoms observed were dilation of the pupil, increase of the heart beat, slowing of the respiration and a fall in temperature. Choleraic diarrhoea invariably appeared. These symptoms, it should be remarked, occurred when the liquid had been boiled previous to being injected, and consequently they could not be due to a germ. From these results it is evident that expired air contains an extremely violent poison, and Brown-Sequard is of the opinion that the slowly exercised influence of this substance on those living in poorly ventilated houses has something to do with the production of pulmonary phthisis.

These facts must suffice to convince us that sufficient causes for many diseases are to be found in the poisons generated within our bodies. A man may drink only chemically pure water, eat only that food which is free from all adulterations, and breathe nothing but the purest air free from all organic matter, both living and dead, and yet that man's excretions would contain poisons, and if they are not eliminated with sufficient rapidity they will produce disease and death. These poisons originate in the metabolic changes by which the complex organic molecule is split up into simpler compounds. We may suppose, indeed, we have good reasons for believing, that the proteid molecule has certain lines of cleavage along which it breaks when certain forces are applied, and that the resulting fragments have also lines of cleavage along which they break under certain influences, and so on until the end products, urea, ammonia, carbonic acid gas and water are formed. We know that substances similar in chemical composition are similar in their physiological actions, and some idea of the virulence of these leucomaines can be formed when I tell you that a number of them contain hydrocyanic acid as a nucleus.

It is highly probable that many of the nervous symptoms which accompany dyspepsia are due to the formation and absorption of poisonous substances.

In some persons the tendency to the formation of poisons out of certain foods is very marked. Thus there are some to whom the smallest bit of egg is highly poisonous; with others, milk will not agree; and instances of this kind are sufficiently numerous to give rise to the adage, "what is one man's meat is another man's poison."

That certain febrile conditions are autogenous there can scarcely be a doubt. These, like other diseases originating within the system, may be due to either of the following causes: (1.) There may be an excessive formation of poison within the body. (2.) There may be deficient destruction of poisons from incomplete oxidation or other destructive changes, as is probably the case with those living in a vitiated atmosphere. (3.) There may be undue retention of the poisons which normally are eliminated by the skin, lungs, bowels and kidneys.

First, we may mention fatigue fever, which is by no means uncommon, and from which the busy physician not infrequently suffers. One works night and day for some time; elimination seems to proceed normally; but after a few days there is an elevation of temperature of from one to three degrees, the appetite is impaired, and then if the opportunity for rest is at hand sleep is impossible. The tired man retires to his bed expecting to fall asleep immediately, but he tosses from side to side all night, or his sleep is fitful and unrefreshing. The brain is excited and refuses to be at rest.

Fatigue fever is frequently observed in armies upon forced marches, especially if the troops are young and raw. Mosso has recently studied this fever in the Italian army. He states that in fatigue the blood is subjected to a process of decomposition brought about by the infiltration into it from the solid tissues of poisonous substances which, when injected into the circulation of healthy animals, induce malaise and all the signs of excessive exhaustion.

This fever is sometimes pronounced malarial, and quinine is administered, but it does no good, often harm, by in-

creasing cerebral excitement. The proper treatment is prolonged rest and possibly recovery may be hastened by the proper use of eliminatives.

Then there is the fever of exhaustion, which differs from fatigue fever only in degree. It is brought on by prolonged exertion without sufficient rest, and often without sufficient food. The healthy balance between the formation and the excretion of poisons is disturbed, and it may be weeks before it is re-established—indeed, it may never be re-established, for some of these cases terminate fatally. The fever of exhaustion may take on the typhus form; delirium may appear, muscular control of the bowels may be lost, and death may result.

Between these extremes of fatigue fever and the fever of exhaustion there may be every degree of fever from over-exertion.

Then again, there is the fever of non-elimination which all physicians of experience have observed. There is a feeling of languor, the head aches, the tongue is coated, the breath offensive, and the bowels constipated. The physician fears typhoid fever, but finds that a good brisk cathartic dissipates all the unpleasant symptoms and the temperature falls to the normal.

Bouchard has shown that normal fæces contain a highly poisonous substance which may be separated from them by analysis, and which, when administered to rabbits, produces violent convulsions. He estimates that the amount of poisonous alkaloids formed in, and excreted by, the intestines of a healthy man each twenty-four hours would be quite sufficient to kill him if it was all absorbed. He proposes the term *stercoræmia* for that condition which results from arrest of excretion from the intestine.

It is not supposed by any one at present that all the symptoms of so-called uræmic poisoning result from retention of urea alone, but the urine contains substances a thousand fold more poisonous than urea, and these are also retained. We take the amount of urea retained as an evidence

of the extent of danger, because we can estimate the amount of this substance definitely, just as we take the amount of carbonic acid gas in the air in making an estimate of the extent to which it is vitiated, and not because we believe that either the urea in the one case, or the carbonic acid in the other, is really the dangerous substance.

That the development of infectious diseases is largely dependent upon the condition of the person into whom the germs are introduced is well known. Two men may drink of the same water infected with the germ of typhoid fever or cholera, and yet one will have the disease and the other escape. The importance of the personal equation in acquiring infectious diseases is fully recognized. That the difference in susceptibility may be due to the relation between the formation and excretion of these poisons generated within the body, I think highly probable.

The foregoing may be considered as a brief resume of what we know concerning the relations of leucomaines to diseases.

A leucomaine may be defined as a chemical substance basic in character, which is produced by the metabolic changes taking place in our bodies.

An autogenous disease may be defined as one which results from the accumulation in the body of poisonous leucomaines.

I will now discuss with equal brevity the relation of chemical poisons to the infectious diseases.

That certain micro-organisms are concerned in the production of many of the infectious diseases there can now be no doubt. The rules given by Koch for determining whether or not a given germ is the cause of a certain disease, do not admit of any doubt when they are fully complied with. But admitting that germs bear a causal relation to the disease, the question arises, how do they produce disease? To this question many answers have been proposed, and the more important of these will now be reviewed.

(1) It was first suggested by Bollinger that apoplectiform

anthrax was due to deoxidation of the blood by the bacilli. These germs are aerobic, and were supposed to deprive the red blood corpuscles of their oxygen. This theory was suggested most probably by the resemblance of the symptoms to those of carbonic acid poisoning. The most prominent of these symptoms are dyspnœa, cyanosis, convulsions, dilated pupils, subnormal temperature, and, in general, the phenomena of asphyxia. Moreover, post-mortem examination reveals conditions similar to those observed after death by deprivation of oxygen. The veins are distended, the blood is dark and thick, the parenchymatous organs are cyanotic, and the lungs are hyperæmic. Bollinger compared this form of anthrax to poisoning with hydrocyanic acid, which was then believed to produce fatal results by robbing the blood of its oxygen.

This theory presupposed a large number of bacilli in the blood, and this accorded with the estimate of Davaine, which placed the number at from six to eight millions in a single drop. But more extended and careful observation showed that the blood of animals dead from anthrax is often very poor in bacilli. Virchow reported cases of this kind, and Joffray found in some of his inoculation experiments that the animals died before any bacilli appeared in the blood. These and other investigations of a similar character began to cause workers in this field of research to doubt the truth of the theory. These doubts were soon converted into positive evidence against the theory. Qemler found that the blood, even when rich in bacilli, still possessed the bright red color of oxyhæmaglobin. Toussaint caused animals which had been inoculated with the anthrax bacillus to breathe air containing a large volume of oxygen, and found that this did not modify the symptoms or retard death. Finally Neucki determined the amount of physiological oxidation going on in the bodies of animals sick with anthrax by estimating the amount of phenol excreted after the administration of one grain of benzol, and found that the oxidation of the benzol was not diminished by the dis-

ease. Thus, the theory that germs destroy life by depriving the blood of its oxygen, has been found not to be true for anthrax, and if not true for anthrax, certainly it cannot be for any other known disease. The bacillus anthracis is, as has been stated, aerobic, while most of the pathogenic germs are anaerobic—that is, they live in the absence of oxygen. Moreover, in many diseases the bacteria are not found in the blood at all. Lastly, the symptoms of these diseases are not those of asphyxia. These facts have caused all bacteriologists to acknowledge that this theory is not the right one.

(2.) If a properly stained section of a kidney, taken from a Guinea pig which has been inoculated with the bacillus anthracis, be examined under the microscope, the bacillus will be found to be present in such large numbers that they form emboli, which not only close but actually distend the capillaries and larger blood vessels, and interfere with the normal functions of the organ. A similar condition is sometimes found on microscopical examination of the liver, spleen and lungs. From these appearances it was inferred that the bacilli produce the diseased condition simply by accumulating in large numbers in these important organs and mechanically interrupting their functions. This is known as the mechanical interference theory.

Klebs and Toussaint were formerly ardent advocates of this theory in its application to anthrax, and the latter thought that the symptoms and death are due to stoppage of the pulmonary circulation by means of emboli. However, Hoffa studied this point by making numerous post-mortem examinations, and was unable to confirm it.

In the majority of germ diseases this theory never had any support. There is not found any great accumulation of bacteria in any organ, and the number and distribution of the germs are such that the theory of mechanical interference can not be held at all.

(3.) Another answer given to the question, "How do germs induce disease?" is that they do so by consuming

the proteids of the body, and thus deprive it of its sustenance. The proteids are known to be necessary for the building up of cells, and it is also known that micro-organisms feed upon proteids. But this theory is untenable for several reasons. In the first place, many of the infectious diseases destroy life so quickly that the fatal effect can not be supposed to be due to the consumption of any very large amount of proteid. In the second place, the distribution of the micro-organisms is such, in many diseases, that they do not come in contact with any large proportion of the proteids of the body. In the third place, the symptoms of the majority of these diseases are not those which would be produced by withdrawing from the various organs their food. The symptoms are not those of general starvation.

(4.) Still another theory which has been offered, is that the bacteria destroy the blood corpuscles or lead to their rapid disintegration. But in many of the infectious diseases, as has been stated, the micro-organisms, although very abundant in certain organs, are not present in the blood at all. Moreover, the disintegration of the corpuscles is not confirmed by microscopical examination.

(5.) Seeing the vital deficiencies in the above theories, and being impressed by the results obtained by the chemical study of putrefaction, bacteriologists have been led to inquire into the possibility of the symptoms of the infectious diseases being due to chemical poisons. In investigating this theory, three possibilities present themselves:

(a.) The micro-organisms may be poisonous *per se*. In order for the conditions of this theory to be fulfilled, the germs must be present in the blood before any of the symptoms appear. But in many of the infectious diseases the micro-organisms are not found in the blood at all. Finally, Neucki, by chemical analysis of the substance of the bacillus anthracis, has shown that in some respects it resembles vegetable casein and in others animal mucin. This "anthrax protein" is freely soluble in alkalies and the dilute mineral acids. It is not poisonous.

(b.) The germs may produce a soluble chemical ferment, which, by its action on the body, produces the symptoms of the disease and death. This theory formerly had a number of very ardent supporters, among whom might be mentioned the late eminent scientist, De Bary. But Pasteur proved it false when he filtered anthrax blood through earthen cylinders, inoculated animals with the filtrate and failed to produce any effect. Neuki made a similar demonstration when he inoculated a two per cent. gelatine preparation with the anthrax bacillus, which liquified the preparation, and, on standing, the bacilli settled to the bottom. The supernatant fluid, which was clear, alkaline in reaction, and contained dissolved "anthrax-protein," was filtered and injected into animals without producing any effect.

(c.) The bacillus may produce a chemical poison by splitting up pre-existing complex compounds in the body. This theory is supported by analogy, when we remember that the ordinary putrefactive germs produce such chemical poisons, as has been demonstrated by the work of Panum and others. These poisons are ptomaines, and the truth of this theory may now be said to amount to a positive demonstration. We now expect to find each specific pathogenic micro-organisms producing its own characteristic poison or poisons. The evidence on this point I will again refer to.

I will now give what appears to me a correct definition of an infectious disease.

An infectious disease arises when a specific pathogenic micro-organism, having gained admittance to the body, and having found the conditions favorable, grows and multiplies and, in so doing, elaborates a chemical poison, which induces its characteristic effects.

The above definition may be illustrated by typhoid fever. The specific germ of this disease must be present.

In the second place it must find in the individual the conditions suitable for its growth. Two men may drink of the same water containing the typhoid germ, one will have the dis-

case, the other will not. The specific germ of typhoid fever is now believed to be that of Eberth. In 1885 Breiger obtained from pure cultures of the typhoid bacillus a toxic ptomaine, which produced in Guinea-pigs a slight flow of saliva, frequency of respiration, dilatation of the pupils, profuse diarrhœa, paralysis and death within from twenty-four to forty-eight hours. Post mortem examination showed the heart in systole, the lungs hyperæmic, and the intestines contracted and pale. This substance Breiger considers the specific poison of typhoid fever, and calls it typho-toxine.

In 1887 Mr. Novy and the writer obtained by inoculating beef-tea with a germ found in drinking water which had been the supply of many persons, who had typhoid fever, an extract which when injected under the skin of cats caused an elevation in temperature of from two to four and one-half degrees.

In one sick with typhoid fever the bacillus grows and multiplies in the intestines and forms the poison, the absorption of which is followed by the rise in temperature and other symptoms. The lesions in the intestines are probably due to the bacteria themselves, or possibly to the local irritating effect of the ptomaine.

There are many reasons for believing that cholera infantum is sometimes at least due to poisoning by tyrotoxon. The fact that infants nourished exclusively from the mother's breast are almost wholly exempt from the disease, strengthens this belief. The symptoms induced by the poison agree with those observed in the disease, and the post mortem changes are identical. Cholera infantum is a disease of the summer months, when decomposition in milk goes on most readily. It is most common in cities and among classes which can not obtain fresh milk or have not the means necessary to keep it fresh. The milk is often allowed to stand in a foul atmosphere, from which it readily absorbs the gases and the germs of putrefaction. Even in country places insufficient attention is given to the care of milk. Cows stand and are milked in filthy barns. The udders are generally not washed before the milking, and the vessels for the milk are frequently not as clean as they should be. There can be no doubt that greater care given to the milk fed to infants will result in the saving of many lives.

APPENDIX IX.

THE SANITARY INSPECTION SERVICE AT HAVANA, ISLAND OF CUBA,

BY

DANIEL M. BURGESS, M. D.,

Sanitary Inspector M. H. S. at that Port.

The proximity of Havana to the United States, with its large and active commerce, and the fact that it is an endemic focus of the pestilential disease, yellow fever, which in its epidemic extension, has so frequently scourged our southern sea-ports, gives special importance to the Sanitary Inspection Service.

This service, in connection with inspection, disinfection, &c., at the port of arrival and the sanitary measures enforced on board vessels while in transit, constitutes the line of defense, which is at present depended upon for the exclusion of yellow fever during the dangerous months.

This is the modern method of sanitary supervision, endorsed by the latest International Sanitary Conference—that of Rome in 1885—and the results attained may properly be compared with those of the method which it has largely replaced, viz: a quarantine of detention at the port of arrival, without any special supervision of vessels at the port of departure and during transit.

It is a matter of history, that prior to the late war, yellow fever epidemics occurred in certain of our southern sea-ports, New Orleans, Pensacola, Savannah, Charleston, &c., so frequently as to give rise to the opinion, among many physicians practicing in those cities, that the disease was of local origin,

and, consequently, that all quarantine restrictions were useless.

The fact, that there has been no epidemic of yellow fever in New Orleans since 1878, and none in Charleston since 1874, and none in Savannah since 1876, is a sufficient refutation of the local origin idea, if there is any one in those cities who still entertains it. That this happy exemption, for a series of years, in those cities in which epidemics were formerly of almost annual occurrence, is due to the measures of protection enforced, and not to a change in local conditions, scarcely admits of question.

In complying with the kind invitation of the state health officer of Alabama, to contribute something on the subject of Sanitary Inspection of Vessels, &c., for the consideration of this important Conference, I would say, that it is the object of the present paper to give an account, as nearly as I can, of the protective measures practiced at the port of departure (Havana); and when the facts are fully known, it will no doubt be conceded by sanitarians, that this sanitary inspection service is a most important factor in our system of defense.

Indeed, an inefficient execution of the inspective service here would make the whole system unreliable, especially as regards the routes via some southern ports, for by these routes a passenger may be landed in Charleston or Savannah within three days of the time of his departure from Havana. As this time is less than the ordinary incubative period of the disease, it is evident that unrestricted travel would open wide a door by which yellow fever might, any day during the dangerous season, be introduced into cities which by their location are especially susceptible to the disease, and by their long exemption from an epidemic have a population, which does not to any considerable extent enjoy immunity from it.

It will be seen that the restrictions which suffice for the exclusion of the disease from the port of New York, for instance, which is nearly five days by sea distant from Havana, and is prepared to take charge of infected ships, or of cases of the disease, without special danger to the community, might be quite inadequate by routes through the southern or Gulf States.

Accordingly, these restrictions have been made much more rigid as regards these routes; restrictions embracing nearly everything, that is known to modern maritime sanitation, including health certificates, etc.

The method of practicing them is more or less as follows:

With the idea of respecting the generally entertained belief that the damper night atmosphere is more conducive to the spread of the specific cause of yellow fever than the day, and desiring to pay deference, to the opinion of some bacteriologists, that the sun-light is a powerful germicide, these vessels are not allowed to enter the harbor of Havana until after sunrise and must leave it before sunset of the same day, never remaining in port over night.

They come in and sail out of the harbor to the windward of the city, and during their stay in it, they are moored to buoys (not using their anchors) in the open bay, remote from other vessels, far to the windward of the city, and centers of population, and in the direction of the prevailing northeast trade wind.

The immense importance in a sanitary point of view of the location of a vessel in the harbor of Havana, and the great difference of risk of infection to crew, vessel and cargo, in consequence of its position and movements while there; as to whether it goes to and lays at and near wharves, or remains always in the open bay, will at once be recognized when the statistics in relation to these facts are known.

These relate to the year ending June 30, 1888, and the eight years immediately previous or beginning in 1879. They comprise only those vessels which went to ports in the United States, and the tables are formulated with reference to locality in harbor, number, number infected and proportion.

The following table gives the statistical port history of 548 vessels for the year ending June 30, 1888:

TABLE—548 VESSELS.

VESSELS.	Number	Infected	Proportion infected.
Which were only in open bay.....	347	0	0 in 347
Which were at wharves on Havana side of harbor.....	151	15	1 in 10
At wharves on opposite side of harbor, Regla and Casa Blanca.	50	2	1 in 25

This table shows that out of 347 vessels bound to ports in the United States, which entered the harbor of Havana during the year ending June 30th, 1888, and which remained in the open bay, not one had yellow fever occur on board, while out of 151 which went to wharves on the Havana, or city side of harbor, 15 or one in ten were known to have had yellow fever occur among their crews; and of the remaining 50 which went to wharves on the opposite side of the harbor, as Casa Blanca and Regla, only two were infected, or one in twenty-five.

This proportion of risk corresponds closely to that of the eight previous years, which embraced the port history of 4,852 vessels bound from Havana to ports in the United States, and gives us a list of 218 infected vessels.

TABLE FOR EIGHT YEARS PRECEDING JUNE 30TH, 1887.

VESSELS.	Number	Number Infected	Prop' rtion infected.
Which were only in open bay.....	2,983	6	1 in 500
Which were at wharves on Havana side of harbor.....	1,246	173	1 in 7
On opposite of harbor, Regla and Casa Blanca.....	623	39	1 in 16
Total	4,852	218	

By that table it is seen that out of nearly 3,000 vessels which visited this port during eight years and left for the United States, and which remained in the open bay, only six, or one in five hundred, had yellow fever occur aboard, while of 1,246 that went to wharves on the Havana or city side of the harbor,

173, or one in seven had yellow fever, and of the 623 that went to the Regla and Casa Blanca wharves, on the opposite side of the harbor, thirty-nine became infected, or one in sixteen.

It should be stated here that the six vessels which had yellow fever occur aboard while remaining only in the open bay, were brought in close proximity to, or surrounded by other vessels which had become infected at wharves and afterward had taken an anchorage in the open bay.

These statistics then prove conclusively that, as a rule, vessels in the open bay of the port of Havana, and remote from others, do not become infected by yellow fever, and that vessels on which practical exemption from it is desired, must be limited in their movements to such localities. Hence, the class of vessels, by them alluded to, are restricted in their movements to the open bay, and never approach wharves.

No person is allowed to go aboard of the vessels referred to without a permit from the sanitary inspector, and no passenger can purchase a ticket or take passage, who has not a health certificate from said inspector. This certificate sets forth that he is acclimated to yellow fever, either by a previous attack, or by a continuous residence of several years, five or more, in towns and cities habitually subject to it in an epidemic form, or where it usually prevails endemically, and who has passed through at least one severe epidemic; or that he is a native of places frequently visited by it, and that there is practically no danger of his conveying the disease.

In cases of applicants for health certificates in whom the inspector personally knows the above conditions to exist, and that by virtue of them the person enjoys immunity from yellow fever, there is no reason why a certificate to that effect should not be given at once—or in other words his health certificate.

But there are numerous cases which present themselves for a certificate, in which the inspector in order to satisfy himself that the conditions required exist, has to adopt methods of investigation to corroborate even the sworn statement of the applicant, and the details are very much as follows :

Applicants for "health certificates" in Havana can for convenience be divided into four classes, viz: Foreigners, Spaniards, foreigners who are natives of places where yellow fever occurs frequently and endemically, and Cubans.

First-class; as to foreigners.—Their own statements as to length of time passed continuously in places subject to yellow fever as well as having had the disease, &c., must be supported by the following documentary evidence. Their cédulas (a paper) which give a personal description of them, their age, nativity, profession, and the place where they habitually reside and passports, also certificate of the consul of their nation, to the effect that to his knowledge they have made correct statements; certificate of some well-known and respectable business house or banking institution that they are reliably informed of the length of time the applicant has passed in the tropics, and where, and as to his having had yellow fever.

If he claims to have had the disease in question, the legalized certificate of the physician who attended him must be produced, or in case he had it in a hospital the certificate of the director of the hospital. In addition the person is questioned closely and cross-questioned in regard to the symptoms he had when taken sick, and throughout his illness how he felt and suffered, in what town he lived at the time, and who attended him, how he was nursed, and other questions, which the investigation suggests, are put.

Second-class; as to Spaniards.—They must produce the documents which identify them; such as cédulas, passports, &c.

The certificate of the inspector of vessels stating the time when they arrived on the island.

Another certificate from the alcalde of the ward in which they live, saying how long they have lived there, and in case of removal that of other alcaldes, &c. Also certificate of some respectable mercantile or banking house stating how long they have lived in Cuba, or other provinces, and in what places. If the applicant claims to have had yellow fever, the certificate of the physician who attended him, or that of the hospital in which he may have passed through it, must be produced with the proper seal attached.

He is questioned as in the case of class first, what symptoms he had, &c., when he was sick from it, and in some cases satisfactory answers are given which assist in making a decision.

Third-class; foreigners from a country or locality where yellow fever exists in an endemic form or habitually.—The certificate of his consul stating that he has lived in such places continuously for many years or is a native of them, or and in addition the certificate of a commercial or banking house of good reputation, stating how long he has lived in those localities, and that he is a native of them.

Fourth-class; when the applicant is a Cuban.—He must present his cedula for his personal identification, which also must state where he was born, his age, and where he lives. Also a certificate from the alcade of the ward where he resides, saying how long he has lived in the ward and city. Furthermore, a certificate from some thoroughly respectable and reliable source that he has lived more than five consecutive years in one of the sea-ports of the island. All questions pertinent to the examination must be answered candidly, upon honor, or if deemed necessary, under oath.

The above methods are pursued with all the vigor that the case under investigation may require, until the sanitary inspector feels himself reasonably justified, in giving or refusing to grant the health certificate. While not a few are refused it is a source of satisfaction to be assured that among the several thousands who have received the health certificate and have gone to ports in the United States in not one instance has yellow fever developed afterward.

This fact is of service in confirming the correctness of the opinion that the passengers were protected from yellow fever.

When small-pox exists at any place on the island these health assurance certificates also certify that the individual from that place is protected from that disease, by a former attack of it, or by successful vaccination, and that the inspector has re-vaccinated the individual.

Persons who have never had small-pox or been successfully vaccinated, are now vaccinated and detained six or seven days

to observe the result of the vaccination, and if this proves to be successful he gets his certificate, but if not successful he is vaccinated again and given a certificate to that effect, and that he is considered safe. It is but just to say in this connection that no person has been known to fall sick with small-pox after getting such a certificate.

To prevent fraud, exchange of certificates, and impositions, a system of personal description forms part of the health certificate for some routes, and the passenger is confronted aboard by the inspector with the certificate. Dirty persons are required to take a bath before going aboard. The baggage of passengers must not only be clean but be known to come from houses and hotels in which there is no yellow fever or it will not be received aboard. These houses are visited to ascertain the fact. As soon as the baggage is aboard each article is taken out and separately sprayed over with a solution of bichloride of mercury 1 part to 1,000, and trunks and other receptacles for it, which have been treated in the same manner are put in the close, clean, hold, and fumigated by the dioxide of sulphur, burning in the process from three to five pounds of sulphur to each 1,000 cubic feet. When sulphur only is used for disinfecting baggage, &c., the articles are hung up or laid loosely around so that the sulphurous acid gas can reach all parts of them. The vessel then without any particular detention can and usually does proceed to sea while the sulphur fumigation is going on, the hold remaining closed as long as possible, eight hours, or more.

No bedding of any description is received, or upholstered furniture, or furniture of any kind, unless it is absolutely new, is taken aboard. No article which can reasonably be suspected of being fomites for the conveyance of yellow fever is allowed to be shipped as freight.

The vessels are thoroughly inspected each trip, in holds, engine and fire rooms, bilge-spaces, water-closets and urinals, and spaces under and around them, fore-castle, glory-hole, galley, pantry, cupboards, drawers, and recesses, wash-rooms, officers-rooms, state-rooms and cupboards in them, apart-

ments for second-class passengers, and such conveniences as may be provided for them, the bedding of the ship, the condition of decks, and other surfaces, in short, all parts of the ship. Good ventilation in all apartments must be maintained (when fumigation is not going on) by all the means made for that purpose in the construction of the vessel and by wind-sails.

When the quarantine, or dangerous season begins, the carpets and heavy woollens of winter use are removed.

Although the use of the best disinfectants and germicides known, is continued all winter, at this time they are resorted to systematically and in much greater quantity.

All bedding, &c., in the officers and crews apartments are, beside the necessary washing, taken out and aired at least once a week, when the ceilings, walls and floors and all surfaces of the rooms are sponged over or wet down with the usual mercuric solution of 1 part to 1,000, and washed with fresh water and soap.

State-rooms and all apartments for passengers are washed and treated in the same way twice a week, or always after a trip to Havana, and bedding washed, cleaned and aired. All urinals, as well as apparatus for holding them, are kept thoroughly clean and frequently washed with a solution of chloride of lime or zinc.

All other apartments in the vessel are treated in a similar manner.

All water-closets are washed two or three times daily, and much oftener if necessary, employing at this time the standard solution of chloride of lime, or a strong solution of chloride of zinc. Decks and some of the thicker and more exposed wooden floors are holy-stoned frequently, chloride of lime being used in the process.

The bilges and bilge-spaces are cleaned and sponged out every week, and treated twice a week alternately with solutions of bichloride of mercury and chloride of lime.

The hold is also whitewashed weekly.

The engine-room is kept clean, and the bilge underneath is cleaned every week, and treated by disinfectants, while every

two days clean sea water is run through the bilge-spaces and pumped out.

As far as practicable the officers and crews of these vessels, are composed of acclimated persons, who are prohibited from going ashore, or visiting vessels in the harbor, without a special permit from the sanitary inspector, and they are individually examined before the vessel leaves the harbor for a port in the United States.

Not one of them has ever been found in the least suffering from any infectious disease now over four years. In the light of what is known of practical disinfection, and the prevention of a vessel becoming invaded by infective disease, it is difficult to see how much more could be done, as the methods above mentioned comprise about all that is regarded as most useful in modern maritime sanitation. To enable the sanitary inspector at Havana to be one of the agents in enforcing these restrictions, they must not only be required by the port authorities at the vessels destination, but desired by the agents, the owners, and those interested in her welfare. Such has been the case in regard to some steamers, and such restrictions have enabled them to continue in active service, without one of their crew or one of their passengers ever suffering from infectious disease, or any reasonable suspicion, or proof that they have in any instance conveyed the specific morbid cause of yellow fever.

It is not pretended that the foregoing restrictive methods can, are, or need be carried out in the harbor of Havana for the security of *all* ports in the United States, and particularly in winter.

The authorities in Havana, are probably, as in most other ports, very sensitive to and jealous of any approach to or assumption of jurisdiction.

We have no treaty with Spain, by virtue of which an United States sanitary inspector is invested with any particular authority. He can, however, do very much to assist in preventing the introduction of infectious diseases into the United States by ships, because of the maritime and sanitary

regulations of the ports of entry, and of the moral support afforded by the consul general of the United States, and the still more important assistance of the authorities in Washington; and in case of danger, he can sound the note of warning.

The bill of health which all vessels should and are expected to carry is the consular bill of health, and is made out and signed by the sanitary inspector as well as by the consul. Such information is given in the document as will assist the health authorities at the port of entrance, in forming an opinion of the sanitary *status* of the vessel and port from which she sails, and will aid in determining what treatment she should receive. It comprises the sanitary history of the ship; her sanitary condition; what her exposures have been in the harbor from which she proceeds; what has happened to her there; what measures have been taken, if any, to improve her sanitary state; sanitary condition of cargo, if she carries any, and when she has ballast, what kind, and where taken in; sanitary condition of crew and passengers—stating whether they have had sickness or not; the existence in the port of infectious diseases as yellow fever, asiatic cholera, plague, small-pox, or typhus fever; how many cases, and how many weekly deaths from them, &c.; and all pertinent information which may assist the health authorities at the port of destination.

To enable the inspector to state intelligently as to the truth of what he certifies, it is clear that he must visit and inspect the vessel and examine the crew. Captains, agents and owners now understand this, and ask him to go aboard and do whatever is necessary, that they may be provided with the bill of health. When the inspector is invited aboard it is apparent there can be no well founded complaint of assumption of jurisdiction, however foreign the vessel may be.

He then inspects the vessel in all parts, hold, bilge, the dunnage ballast, water-closets, forecastle, cabin, &c., and indicates what should be done.

In some instances he is asked what can be done to make the vessel more acceptable to the health authorities at the port of destination.

There are quite a number of lines which are not only willing but anxious to do everything reasonable within their power to prevent yellow fever getting aboard, or if there is danger of its being aboard in fomites to disinfect and destroy the infectious agent at once.

Such lines as Ward's, Morgan's, Plant's and Alexander's, are excellent examples. They not only keep their vessels away from wharves and dangerous places, but are willing to cleanse and to use disinfectants in their vessel, cargo, ballast, bilge, &c.

Others are indifferent to exposure, sacrifice comparative safety to convenience, lay during the very dangerous season of the year at wharves, with their ship's company going any and every where they please, and say, "Oh, we will take our chances;" and that class of captains are ever ready to deny that they have had or have now any sickness aboard.

The key to the sanitary condition of the port of Havana in relation to infectious diseases lies largely in the hospitals, public and private, of which there are eight or ten.

Here the inspector is very vigilant, and here he will usually encounter the sick from vessels and can learn what ships they are from, &c. Frequent visits are made to these institutions.

From what has been stated in this paper, it would seem that vessels going to the United States from the port of Havana can, for the convenience of bills of health, be classified into four different classes:

The first class, or "good," would include those vessels which remain in the open bay, keep their crews aboard, and, in short, observe rigidly all the methods of modern maritime sanitation. In them the sanitary history, condition, cargo, crew and passengers are all marked good. Sailing vessels would take neither cargo, ballast or passengers from Havana. It is believed that the most of such vessels could enter ports in the United States at any season without imperilling the health of these ports.

Second class, or "fair," includes such vessels as do not go to wharves, neither are they particular about the use of disinfectants or extreme cleanliness. These may go to wharves

during winter months, in which case they disinfect and cleanse thoroughly.

Third class, which are indicated by "fair only," or "a little suspicious," are those vessels which go to wharves but have not had yellow fever aboard in consequence. Fair only, or a little suspicious, are intended to be synonymous terms.

Fourth class—"suspicious," sometimes "evidently infected," are those which go to wharves in the dangerous season which are known or believed to be infected—or those vessels which, although in the open bay, have become surrounded by infected vessels from the wharf, and in consequence have had yellow fever occur among their crew; and in which little has been done to remedy their insanitary condition.

There is every reason to believe that many vessels, at wharves, become infected in fact, particularly Spanish vessels, which do not reveal their dangerous condition by any sickness existing or having occurred aboard, as their entire crews have immunity from yellow fever by having had it before. Other vessels on entering the harbor immediately discharge all unacclimated persons, and ship new ones only the moment they desire to leave. In such cases there can be no tell-tale incident to betray their actual condition in regard to infection.

It is found that the statements of the officers and crew of the average sailing vessel are so unreliable that the sanitary history must depend to a great extent upon the vigilance and port experience of the inspector himself. Captains have frequently declared, that they had had no sickness, when the inspector knew and had seen some of their men sick in hospital with yellow fever, and again confronted them aboard convalescent, but still yellow as oranges.

Instances like the following used to occur much oftener than at present :

A Spanish steamer, bound for New Orleans, applied a few years ago for the consular bill of health, presenting that of the local board, in which it was stated that all *were well aboard* and that there was no disease of an infectious or epidemic character in the harbor. I knew that the steamer had been discharging

three or four days at an infected wharf, and on going aboard to inspect crew and vessel, I found the chief engineer and two men down with yellow fever. The engineer's case was a rapid and malignant one, for he was already vomiting black and wondering what it was, and why he felt so weak in so short a time. The sick were all sent ashore and the engineer died the next day. Here was a vessel about to start for New Orleans, with a *clean* bill of health from the Cuban or local board of health, while three of her crew were actually sick and dying of yellow fever aboard.

The unreliable character of bills of health, issuing from local boards of health in some foreign ports, subject to all the influences of social, political and commercial surroundings, which consider only the supposed interest of their own place, is well shown in such an instance as has just been narrated. It also shows that that instrument, to be of protective sanitary value, should be made out by one who not only keeps himself *au courant* with the prevailing diseases, and particularly any of an infective character, but also with the sanitary condition of the port and the vessels therein. He also should be one whose interests and sympathies are with the people of the port of destination, who has a natural and loyal desire to assist in protecting them from the introduction of infectious and contagious diseases, and who can be held responsible to those who appointed him and to the country which he serves. In the faithful execution of his mission, he often has many disagreeable duties. Where is the sanitarian or quarantine official who at times is not criticised most unjustly and unmercifully, and calumniated without sense or reason? Every captain wants what he calls a *clean bill of health*, no matter how infected the city and wharves and his vessel may be. The sickness may have occurred aboard, and which may have resulted in death from yellow fever in hospital or elsewhere, he calls a bad cold, or the result of the bad care the sailor took of himself, &c., or anything to disguise the facts.

The sanitary inspector frankly, in the consul's bill of health, tells whether in his opinion the sanitary condition of the port, and *vessel particularly*, is good—fair—a little suspicious—or

suspicious and infected, and thus a hint is given to the authorities at the port of arrival. Notwithstanding the principal sources of danger to legitimate shipping, and therefore to ports to which they are bound, are sufficiently indicated for all practical purposes. Standing as I do as a kind of sanitary lookout, I cannot close this paper, already perhaps tiresome in detail, without referring to a constant source of peril from the introduction of yellow fever into the States of the South, and particularly Florida, infinitely greater than all others put together. I refer to that kind of illicit intercourse which is carried on between the ports of Cuba, principally Havana and Florida, by a class of light-draught, fast-sailing vessels which sail from there in quite large numbers. These have for their ostensible and legitimate business, fishing, and they are called *viveros* or fishing smacks, and while they do quite a fair business in that way, they often do a more paying one in an illegitimate manner by smuggling different articles into the country on whose coasts they hover for both of the above purposes.

No dirtier or worse smelling vessels probably leave the port of Havana; their inside condition and atmosphere being eminently favorable for the reception and growth of such disease germs as thrive under the influence of heat, moisture and filth. Laying, as many of them do while here (and that for a long time frequently), at wharves notoriously dangerous, with an under deposit of sewage and fecal pollutions, and doubtless infection, every opportunity is given the cause of yellow fever to get aboard, and render the little craft a vile storhouse of infectious disease. Moreover, there is reason to believe that young men recently arrived from Spain, and totally unacclimated, are at times shipped as some of the crew.

The articles which this class of vessels can smuggle into Florida and Mexico to the greatest advantage are cigars, *aguardiente* or rum, gin, wine, fruit, etc. The inducement to smuggle *aguardiente* and rum is very great, as the spirit which costs only twenty-five or thirty cents a gallon in Havana, pays a duty of two dollars a gallon in the United States.

The method of doing these two branches of business, viz :

fishing and smuggling, is an open secret at Havana, and the fishing fraternity, when they have a little confidence in the person to whom they are talking, say very frankly that it is not a difficult thing at all to smuggle their stuffs into Florida or Mexico, and there is but little danger in it.

These vessels clear, or rather leave port, with a simple permit to go out and fish on the high seas or along the coast. Being small of size and resembling coasters they go out at any time (usually at night), but no one knows when or where bound.

Once outside of the Moro Castle, some of them may go and fish in the waters up about Cardenas and Sagna, others to the banks of Yucatan, while a large number will try to better their fortunes in the waters and inlets of Florida. Some of those for Florida may transfer their goods to Confederates among that line of keys which terminates at the Tortugas, while others will go farther up and hover around the coast of the main land, all the way from Punta Rossa, Charlotte Harbor, up past Tampa, and even on beyond Cedar Keys.

Here they are on the alert, waiting a favorable opportunity to dispose of what they have, either to confederates, or make an unlawful incursion into some of the many inlets, bayous and passes on that coast. Once inside, they communicate with the people or settlements they may know, interchange visits and commodities, friends sleep aboard, articles are carried ashore, and it is feared infective disease brought in with them from Havana.

I am credibly informed of these methods, and that many outside of fishing and smuggling circles know of them. Captains of steamers running along the coast from Charlotte Harbor to Tampa, etc., tell me that they often see about day-break this class of vessels which they know to be Spanish, coming out of the inlets, bayous and passes. They have no business there except to smuggle. If this smuggling was limited to articles of commerce it would be bad enough, but when terrible infective disease is smuggled into the midst of an unsuspecting people in this manner it is in the highest degree culpable.

Florida, with an extent of sea-coast greater than that of any other State bordering on the Atlantic or Gulf, is more exposed by these smugglers than any other State in the Union.

A condition of things has increased this illegal business very much within the last few years. Several years ago Spain put so high a duty on the importation of live fish from the States that the many fishing smacks, which up to that time had been doing a nice paying live fish business from Key West and other places of Florida, were obliged to suspend business. A large portion of those little vessels were then sold to live fish merchants in Havana, and since then there have been not far from fifty of these light-draught, fast-sailing vessels going out of the harbor of Havana. Being nearly all built in the United States, in American waters they are taken for American vessels till they are made to show their papers.

During that period, or the last five years, a large and rapidly increasing population has appeared in Florida, and particularly on the Gulf coast, which requires the very articles to be found in Havana.

It is well known that where there is a demand for an article, the article is very sure to be obtained in some way, either by fair or foul means.

Finally, I would say, that in view of the facts stated, and as a result of my personal observations as sanitary inspector at Havana, I am decidedly of the opinion that one or more lines of steamers to Florida ports, under proper sanitary supervision, and all the restrictions mentioned in the first part of this paper, whereby danger of their conveying disease is reduced to a minimum, will do much to suppress this illegal traffic by transporting the articles required.

The danger of introducing infectious disease by such steamers is so small, that it cannot for one moment be compared to that infinitely greater one by the smuggling by vessels referred to.

APPENDIX X.

"THE QUARANTINE OF THE FUTURE"

BY

W. C. VANBIBBER, M. D.,
of Baltimore, Md.

I desire to enlist your interest in the design of an establishment for the promotion of health and the suppression of disease. I can not doubt that similar ideas may have occurred to many of you; but as I have given the matter much and careful consideration, and have thoughtfully weighed all the points that presented themselves to my mind, I have the temerity to suppose that the design I shall suggest will probably be more complete in detail than any that has been proposed. At least, I am safe in saying that no such system has yet been put into operation in this country, even in those localities where something of the sort is most urgently demanded. I will call my design, for the present, a system of quarantine, as its first object is to prevent the introduction and spread of communicable disease; but I energetically protest against my views suffering prejudice by reason of the repellent associations which are too often—and often too justly—connected with that name. As the hospital of to-day is something very different from the "lazaretto" or lepers' house of the middle ages, so the quarantine of the future must be something different from the inefficient, and at best unattractive, quarantine of to-day. I will call it the "State Bureau of Health and Quarantine," and look forward to a system which will be not only scientific and effectual, but attractive; so that those for whom it is provided, whether for personal treatment or for public

safety, will rather be lured to it than repelled ; and the sick gladly avail themselves of its beneficent arrangements. I look forward to an establishment worthy of the State which founds it, and a pride to her citizens. If such a result be desirable—which I think will hardly be questioned—and if the design which I shall broach promises to realize such a result—of which you must be the judges—may I not appeal to my professional brethren to come forward as pioneers in this movement ; to give the light of their experience and wisdom in perfecting what may be left imperfect, and the weight of their influence in disseminating enlightened ideas, and combatting old prejudices ? It lies with them to explain to the public what a well-equipped and scientific quarantine system ought to be, and may be ; and how thoroughly physicians, if their exertions are supported by wise laws and seconded by public opinion, can now cope with those communicable diseases which are so often, and have been so recently, causes of wide-spread suffering and of the wildest terror. There is an old saying that “afflictions are often blessings in disguise.” Though in no case, perhaps, is the disguise thicker and harder to penetrate, than in that of a great epidemic, yet even here it lies with us to make the proverb good, if the effective epidemic leads us to devise means against its recurrence. Certainly it is a discredit to our civilization, to our humanity, and almost a reproach to the noble profession to which we have devoted our lives, that such diseases should paralyze whole communities, and drive them into paroxysms of frantic terror. Recent advances which have been made in the study of the quarantined diseases, will permit some things to be done now with safety, which were not formerly allowed.

Formerly, if a community proposed to place a quarantine establishment in an accessible, convenient and desirable situation, such opposition would be made, and such influences brought to bear, that the site would have to be abandoned, and the buildings, necessarily located in some un-

attractive, inconvenient and perhaps unhealthy place---turned out into the wilderness like the scape-goat, and pursued even there by the fears and aversion of the whole community. All this is, or should be, a by-gone state of things. In the city in which I live—Baltimore—when more than sixteen years ago, the late John Hopkins bought thirteen acres of land within the city limits and proposed to build thereon a public hospital, there arose strong opposition on the ground of prejudice and the dread of spreading disease ; but now that the noble foundation, which bears his name is erected, none of this feeling exists.

Our people are logical, and it did not take long for the objectors to see that the function of a hospital is to extinguish disease, not to spread it ; and that communicable diseases are far less dangerous to the community when confined under the immediate control and supervision of a corps of physicians and nurses, who may be able to sterilize the germs emanating from infected patients, than if these latter were allowed to scatter themselves throughout the community, and become FOCI of infection at many points. The fact is, it is only necessary for the people to understand how different, the well appointed scientific hospital of the present day, is from the traditional hospital of the past, and their views and prejudices would undergo a radical change. Let me state what I think would be the public feeling here, where we now are, if such a question should arise. Should the State of Alabama propose to erect a quarantine establishment in the city of Montgomery, and set about securing land for the purpose, opposition might at first be raised by adjacent property-holders ; but it would subside as soon as it was known what the hospital was going to be. A properly built and appointed hospital is an embellishment to the city that contains it. Its buildings are imposing, its grounds are spacious, ornamental and well kept, and have the beauty and advantages of a public park. The establishment becomes one of the attractions of the city, and neighboring property is enhanced

in value. Those of you who have seen the Johns Hopkins hospital, to which Baltimoreans always take guests from abroad, as one of the chief attractions of the city, can bear out what I say. Now if proper ideas can be disseminated on this matter, if the people can be convinced that a quarantine can be made safe, efficacious and at the same time attractive, that it will effectually prevent not only the spreading of disease, but the spreading of *panic*, such a quarantine will certainly enlist in its favor the whole body of public sentiment. But to attain this desirable end, the community must be enlightened as to the results which have followed the study of quarantined diseases, and the use of sterilizing agents in combatting them, of which we have learned much of great value from Dr. Wilkinson's paper.

The diseases now quarantined in this country—I need not speak of such rare and exceptional cases as Asiatic-leprosy—are three; small-pox, cholera, and yellow fever. What physician is there who has any dread of small-pox in his own person, or for his immediate family or his obedient patients? The physicians and people of England have nearly convinced the world that the spread of cholera may be checked by sanitary measures; and if that disease spreads through a community, it is the fault of the people. I say this on the authority of one who is with us now, Surgeon George H. Sternberg of the U. S. Army. It only remains, then, to speak of yellow fever.

Less careful and less advanced people than we are, living near our own coasts, bring this disease to us. It comes from Hayti, Cuba and Mexico.

We know many of its ways and peculiarities. It has never yet gained a permanent abode in our country. I say this on the authority of Dr. Cochran and Dr. Wall, as also of other physicians in New Orleans, though I admit that Surgeon General Guiteras, U. S. M. H. S., from some recent investigations in Key West, is not so sure on this point. Be this as it may, it is the clear and urgent duty of us

Americans to prevent the introduction or the domestication of this pest-germ on our soil if we can. The several states and the Federal Government are alike interested in this matter. The germ has been most frequently brought into Louisiana, Texas, Alabama, Georgia, and the two Carolinas. But it has also been brought into Virginia, Maryland, Pennsylvania and New York; consequently all the states in the Union have a common interest in excluding this *germ and this disease*. This convention has assembled here to consider this subject. How do you propose to advise those governments to make this attempt? It is not without preparation that I appear before you, gentlemen, and give my humble advice in this important and much debated matter. With the knowledge, and all the facilities now at hand, an establishment may be erected which will in time become the centre of study, for information and of authority upon these points; and as soon as built and equipped, will be a school, an asylum for patients, a place for isolation and for controlling communicable diseases by subduing the germ. The drawing shows the plan of such an establishment designed with the view of fulfilling these purposes. I will explain it more in detail later. It consists, as you perceive, of four buildings, kept well apart; a separate hospital for each of the quarantined diseases, and a building for the administration. These four buildings are connected with all parts of the State by railroads and telegraphs, and with each other by railways, telegraphs, telephones, and electrical transits. It is intended that the spacious grounds shall be laid out as a park; portions being reserved for the exercise and recreation of convalescents, and other portions for those persons who come from an infected locality; but exhibit no symptoms of the disease; and who, of course, are most likely to be impatient under detention. Quarters should be provided for these in the main building, and every practicable arrangement made to render their sojourn as pleasant as possible. The whole establishment should be located in as attractive and heal-

ful site as possible ; and given as much the air of a summer health resort, as may be consistent with the purposes for which it is destined.

The main building would be the place at which all information should be centered, and from which all authority should emanate. Here would be the headquarters of the medical staff; and here the knowledge acquired at the bedside would bear its fruits. Here should be kept models and designs for building; here should be exhibited the highest standard of cleanliness; here should be formulated the sanitary rules. Each subsidiary department should be complete in itself. The small-pox department should undertake to keep on hand thoroughly reliable vaccine virus, and distribute it throughout the state. The working of such an establishment would be something like this: on the appearance of quarantinable disease any where, or the landing of passengers from an infected locality, the staff would be immediately communicated with. At once officers would be dispatched to remove the infected or suspicious persons, to investigate the circumstances thoroughly, and take all necessary measures. The very presence of these officers, and the knowledge that the matter was being promptly and efficiently dealt with, would quiet alarm. If I may use a trivial comparison, it would resemble the introduction of the modern fire department in to a great city. I can remember when Baltimore, New York and Philadelphia were protected only by volunteer fire companies with hand apparatus; these firemen were brave and devoted men; but there was no proper organization, no discipline, no efficient appliances. They worked at random, and therefore at a great disadvantage. Any one who chose might offer his advice or his services, and this well meant zeal was often a hindrance rather than a help. The consequence was that a large fire spread alarm over the city. Now that we have a thoroughly organized department, with experienced chiefs, improved apparatus, and thorough drill, the fire alarm scarcely causes a ripple of excitement. Every one

knows that whatever can be done, will be done, and that the whole business is in the hands most competent to manage it. The practical advantages of such a system as I have described may be summed up as follows: 1. It would prevent panics. For nothing could be more necessary to a community than the knowledge that there was such a body of men, at all times ready to meet the first appearance of disease, and thoroughly provided with the means to cope with it. 2. It would give the greatest facility for preventing the outbreak of an epidemic, and subduing the germ if it made its appearance. 3. It would give the best possible facility for the recovery of patients attacked, by combining the most effective medical treatment with the most perfect possible sanitation. 4. It would be a headquarters for all movements in the direction of hygiene and sanitation, whether these should take the form of warning, or instruction to the people, suggestions to medical practitioners or recommendations for legislation. 5. Each of these establishments would be in communication with other similar establishments in this country or the world, that whatever advance was made, or knowledge acquired at the one, would at once inure to the benefit of all. Thus each would possess at once the highest possible authority; and would be a school at which medical practitioners could learn the latest results of science in every branch that came within its scope. Such an establishment should be built upon a large domain; and this domain might at the same time serve for *other* useful *public* purposes. Here might be medical or other scientific colleges and museums; a vaccine virus farm, an agricultural college. The domain, if near a city, might be a suburban park.

So far as I can judge there is more knowledge now existing among the medical officers of the United States concerning this branch of public necessity, than can be found elsewhere. Any one who doubts this need only visit the war, navy and hospital department in Washington, where he can judge for himself. I am not thoroughly acquainted with what has been done by other governments in the way of collecting informa-

tion bearing on that branch of the public safety which relates to communicable diseases, but from conversations with our officers, I have reason to think that, in unapplied knowledge, at least, we are in the advance. It is therefore eminently fitting that the federal government should utilize these collected treasures of knowledge, and show the work—the needed quarantine of the future. It seems to me that this might best be done in Florida; a state perhaps more dependent at present on her sister states, than the others, and important as a winter resort and refuge for the inhabitants of more vigorous climates. If by means of such a system, Florida was always and certainly safe for visitors when the northern cold began to be trying to persons of delicate health, or sufferers from pulmonary affections, the advantage and the blessing would be incalculable. I believe that this matter could be so presented to congress as to enlist the favorable consideration of that body; but in this matter I can only offer suggestions, leaving choice of steps to the judgment of others. I will now explain the details of the drawing.

NOTE—in this drawing the architect has also shown how a healthy house may be built in a warm climate, standing upon piers, with a clear story above, and a garden roof. I am aware of an objection that may be raised to my plan. It may be said that if it succeeds—if communicable diseases be stamped out or reduced to minimum, our staff of trained physicians and assistants will have nothing to do. We can not scatter them to the four winds and put the buildings in charge of care-takers, and hope to find every man at his post again if disease should break out. I answer that I would make the institution the permanent centre of hygiene for the whole state. Now hygiene and sanitation never rest; they are always furnishing new occasions for deliberation, investigation and action. Sudden outbreaks of typhoid fever, of diphtheria, of the more malignant types of zymotic disease, can often be traced to local or preventable causes.

In such cases as these—and they are constantly occurring—our staff would be called upon. Many other cases will occur

to you, which I need not suggest. I think that in denominating the institution a state bureau of health and hygiene, I meet the objection fully. Besides preventing panics, and giving every possible chance for subduing and curing the disease, this advanced and elevated treatment of it, will have a tendency to change or reduce its management from a rough and pestiferous detention, to an enlightened and agreeable attendance upon the laws of the treatment and prevention of disease. This change, I think, is due alike to the unfortunate patients themselves, as well as it is the best policy for the public. From conversation with some of our statesmen, it is my belief, that congress could be interested in this national matter, but I must leave the rest, my brethern, with you, to take what action you may wish, to bring about this desired result.

NOTE.—The plan for the buildings has been omitted.

APPENDIX XI.

A PLEA FOR YELLOW FEVER INOCULATION AS A PROPHYLACTIC MEASURE,

BY

DR. J. McF. GASTON,

of Atlanta.

As germane to the object of this Conference for the prevention of yellow fever, it seems proper to consider the claims of a prophylactic measure which, if it effects anything, is to be regarded as the most radical means of preventing the access of yellow fever. I refer to inoculation with the attenuated virus of yellow fever. It is known to me that there are distinguished gentlemen present who differ from my view of this measure, yet I trust they may aid in the elucidation of this subject.

I would state that previous to the past six years, my residence in Brazil for a long period, enables me to act understandingly in this matter, and my only interest is for the general good.

From Dr. Sternberg's instructive and interesting description of the observations made by himself and others, it is inferred that the germs or bacteria presented by Freire, Carmona, Gibier, Finlay and others, are not to be regarded as identified uniformly in connection with yellow fever, so that the yellow fever bacillus has yet to be discovered. It is most probable that the views of Dr. Vaughan in regard to certain diseases being developed by ptomaines after the death of bacteria in the different structures, may be the key to explain the phenomena of yellow fever. All are aware that in the case of hydatids,

the chief element of disorder is their death, and hence it would seem that the most philosophic investigation after the progressive changes in yellow fever have resulted fatally, should not detect living bacteria in the structures of the body, but that they should be sought in the fluids or secretions of the subject of yellow fever in its early stages.

Independent altogether of the recognition of a special bacillus of yellow fever, there is a practical question of prime importance in regard to the feasibility of protection by any process of inoculation or vaccination, such as proves effectual against the small pox.

When Jenner introduced vaccination nearly a century ago, the presumption against his process was stronger than that which exists at the present day against yellow fever inoculation, and it was necessary to determine by actual demonstration that the modified impression produced by vaccination really gave immunity from any serious effects of variola.

This is the course which must be pursued with respect to inoculation against yellow fever.

Facts are stubborn things, and, as in medicine we use many remedies empirically without having any rational explanation of their *modus operandi*, we are called upon to test the prophylactic virtues of yellow fever inoculation without having a truly scientific clue to its efficacy.

If it appears that inoculation in any form or with any substance, be it a bacillus or not, prevents or modifies the progress of yellow fever in human beings, we are warranted in resorting to it to secure our people against the ravages of this disease.

It is claimed that such a process has been employed with satisfactory results in Rio de Janeiro by Dr Domingo Freire, and the results have been tabulated, giving the names and location of those inoculated, reaching above seven thousand individuals, subject to the scrutiny of interested observers. The deaths among all those subjected to this process have not exceeded one to the thousand, while the percentage of deaths among those attacked with yellow fever in the same localities

has far exceeded this proportion, being one in one hundred. Under such circumstances we must either disprove the statistics or accept the results as conclusive in favor of inoculation by the attenuated virus of yellow fever.

A thorough examination of the data by a competent commission of practical observers prepared to discriminate between the true and the false, is the only available mode of testing this matter, and while scientific investigation should prove many points of great interest, there are elements of common sense requisite to reach correct conclusions by the members of this commission.

In view of the fact that inoculation with the attenuated virus of yellow fever has been used as a prophylactic measure, and in consideration of the action taken by the American Health Association and the American Medical Association recommending the appointment of three commissioners for the investigation of this subject, while the United States Government only authorized one commissioner to visit Brazil and Mexico in furtherance of this proposition, it is the sense of this Convention that the object intended by the said Association has not been satisfactorily met or complied with.

Furthermore, it is worthy of note that favorable action was taken by the International Medical Congress, in recommending the investigation of yellow fever inoculation; and in consideration of these facts—

Be it resolved, That inoculation with the attenuated virus of yellow fever for the modification or prevention of this disease, calls for thorough examination, and that the statistics should receive careful and discriminating investigation by practical observers for the verification of the data presented.

Be it further resolved, That this Convention acquiesces in the recommendation of the above named associations that three commissioners be appointed by the United States Government for a full investigation of the claims of the prophylactic virtues of inoculation against yellow fever.

APPENDIX XII.

SPECTROSCOPIC EXAMINATION OF BLACK VOMIT,

BY

DR. GEO. T. KEMP,

Of Hoagland Laboratory.

BROOKLYN, N. Y., March 4, 1889.

My Dear Doctor: After your departure, I opened the bottles containing the black vomit collected by you last June. The vomit was much decomposed, but in spite of this decomposition the masses of partly decolorized red blood corpuscles could still be made out. A spectroscopical examination proved the existence of blood pigment beyond a shadow of doubt! The reaction of the vomit was strongly *alkaline* from fermentation, and the vomit, untouched by any chemical reagent, gave the spectrum of *alkaline hæmatin*. Boiling this with acetic acid gave the spectrum of *acid hæmatin*, and treating the vomit with Stokes' fluid and ammonia gave the characteristic beautiful bands of Hæmochromogen, (Stokes' Reduced Hæmatin). These are the characteristic spectra which one would expect to obtain from decomposed blood, and prove, beyond all question, the presence of blood pigment in the vomit.

These observations agree with those of Dantec, except in one point, viz: that he found the pigment in the condition of hæmaglobin or methæmaglobin. There is not the slightest contradiction here, for he examined the vomit fresh, while the specimens at my disposal had undergone alkaline decomposition, and this process *should* change the hæmaglobin or methæmaglobin

found by him, into the alkaline hæmatin found by me. Our observations, therefore, are entirely in accord. I only examined the specimens taken from the *stomach*; the specimens of dark colored material from the intestine, I shall examine later.

